

JANUARY 1955 Volume 70 Number 1

PUBLIC HEALTH REPORTS

In this issue

Studies in Industrial Health

Community Programs

Sanitation

Survey of Cause-of-Death Statements

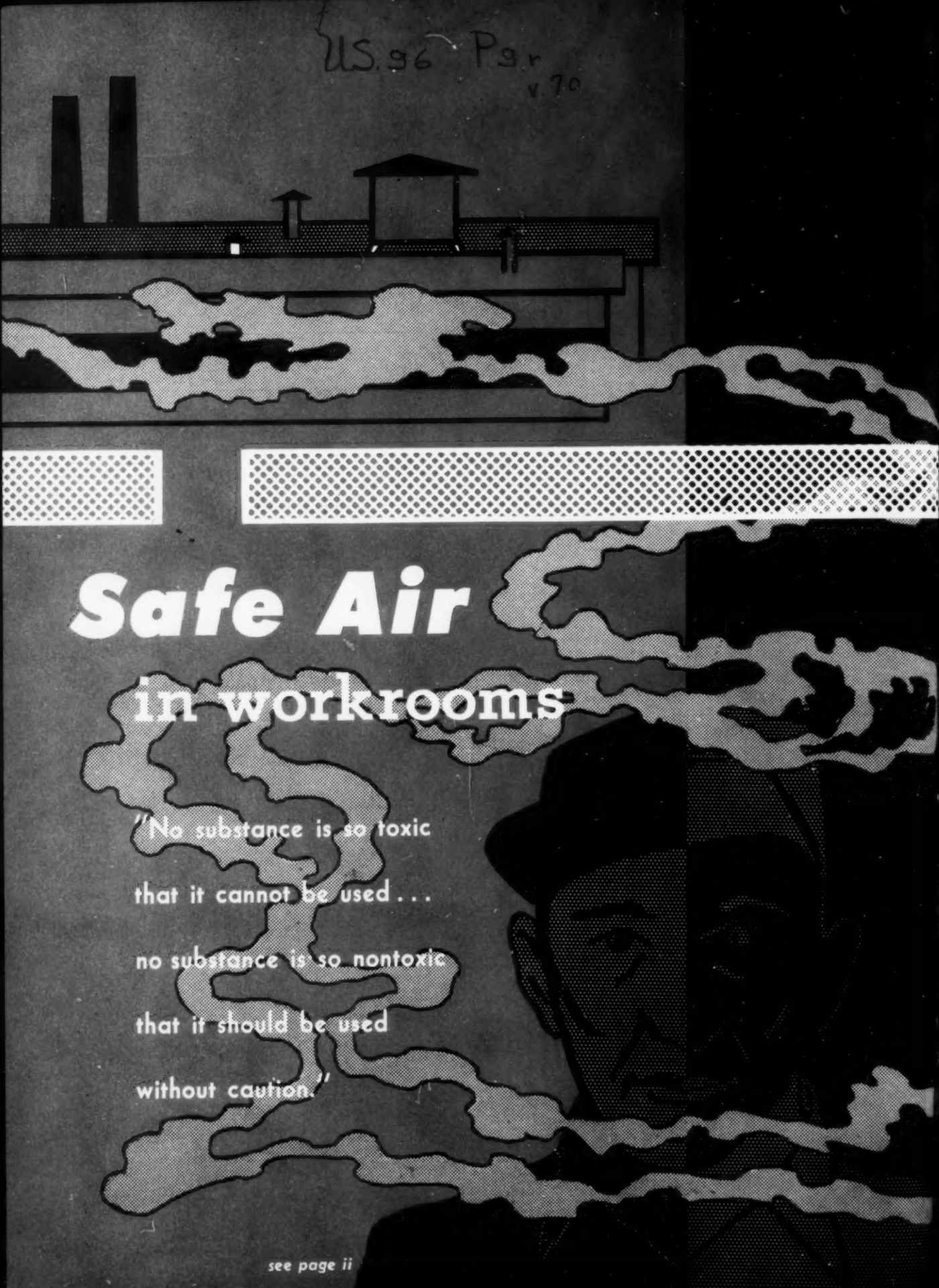
Filter Detection of Enterococci

Public Health Conference



U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service

US.96 Pgr
v.70



Safe Air in workrooms

"No substance is so toxic
that it cannot be used . . .

no substance is so nontoxic
that it should be used
without caution."

see page ii

PUBLIC HEALTH REPORTS

Published since 1878

Contents

	Page
Standards for safeguarding the health of the industrial worker----- <i>Herbert E. Stokinger.</i>	1
Histoplasmin, coccidioidin, and tuberculin sensitivity among school children in two Texas counties----- <i>Michael L. Furcolow, Charles F. Federspiel, and Howard W. Larsh.</i>	12
Guidelines to community development programs----- <i>George M. Foster.</i>	19
Dining car sanitation in the United States----- <i>William H. Megonnell and Edmund C. Garthe.</i>	25
Results of the cancer teaching program in dental schools----- <i>Raymond F. Kaiser.</i>	35
Accuracy of cause-of-death statements on death certificates----- <i>George James, Robert E. Patton, and A. Sandra Heslin.</i>	39
Health in foreign operations----- <i>John H. Stambaugh.</i>	52
School health education in Dearborn—A growing program----- <i>Frank H. Jenne.</i>	57
High blood pressure—Research progress report-----	64
Use of the membrane filter technique to enumerate enterococci in water ----- <i>L. W. Slanetz, D. F. Bent, and Clara H. Bartley.</i>	67
The Commissioned Reserve in defense and disaster health services-----	73
Evaluating short health training courses through content analysis----- <i>Allen D. Spiegel, Theodore I. Bleeker, and Shirley G. Bortoluzzi.</i>	75
Sickness as recorded in family surveys-----	81
A mental health program is born----- <i>Murray Grant.</i>	83

Continued ►

Threshold Limits

Notable progress in the establishment of reliable threshold limits, or maximum allowable concentrations, for injurious agents in the workroom air has been made largely during the past decade.

The chaotic situation that existed prior to that time is reflected in the early reports of the American Conference of Governmental Industrial Hygienists. Organized in 1937, this group was one of the first to concern itself with the development of workable, uniform toxicity guides for the provision of a healthful working environment.

In 1942, the Subcommittee on Threshold Limits of the Committee on Technical Standards presented as its first report to the conference a table of the maximum allowable concentrations established by various States for atmospheric contaminants. Values for more than 60 substances were given. Some of these substances were listed as many as three times, reflecting the different values set by the States. The concentration for nitrogen oxides, for example, was 29-70 p.p.m. in 1 State, 40 p.p.m. in 4 States, and 10 p.p.m. in 7 States.

Such variations were based in large part on very limited experience. Gradually, the accumulation of toxicological data and information based on clinical studies of exposed workers, environmental investigations, and animal experimentation has provided a firmer, broader base for the establishment of maximum allowable concentrations.

The 1954 threshold limits list of the American Conference of Governmental Industrial Hygienists presents single values for over 160 different substances. In addition, there is an accompanying tentative list of values under trial and test. Henceforth the tentative list will include all substances not previously listed.

For a review of threshold limits and other limits and tests for safeguarding the health and comfort of the industrial worker, see the paper by Dr. Herbert E. Stokinger on page 1 of this issue.

Contents for January, continued

Pennsylvania Health Conference:	Page
Cardiovascular health center in New York..... <i>George James.</i>	87
Progress in State rehabilitation program..... <i>Floyd L. Kefford.</i>	89
Chronic disease factor in public assistance..... <i>Robert P. Wray.</i>	91
Facilities inventory for chronic sickness..... <i>Ira J. Mills.</i>	93
The local health laboratory..... <i>Edmund K. Kline.</i>	94
Short reports and announcements:	
Threshold limits (Frontispiece).....	ii
Community health week, March 21-27.....	11
Tenth National Conference on Rural Health.....	56
Venereal disease postgraduate course.....	63
Dr. Hugh Rodman Leavell.....	66
East coast migrant conference report.....	72
PHS medical research grants.....	74
PHS advisory council appointment.....	86
On the care of premature infants.....	97
Technical publications.....	98

Published concurrently with this issue:

PUBLIC HEALTH MONOGRAPH No. 25 . . . Sickness experience in
selected areas of the United States.

*Selwyn D. Collins, Katharine S. Trantham, and Josephine L.
Lehmann.*

96 pages. A summary and information on availability appear on pages 81-82.



PUBLIC HEALTH REPORTS



G. ST. J. PERROTT

Chief, Division of Public Health Methods
Managing Director

ARTHUR P. MILLER
Acting Executive Editor

TAFT S. FEIMAN
Managing Editor

WINONA E. CARSON
Asst. Managing Editor

BOARD OF EDITORS

EDWARD G. MCGAVRAN, M.D., M.P.H., *Chairman*
Chapel Hill

GAYLORD W. ANDERSON, M.D., DR.P.H.
Minneapolis

LLOYD FLORIO, M.D., DR.P.H.
Denver

JUSTIN M. ANDREWS, SC.D., LL.D.
Washington

RUTH FREEMAN, R.N., ED.D.
Baltimore

H. TRENDLEY DEAN, D.D.S.
Chicago

VICTOR H. HAAS, M.D.
Bethesda

HALBERT L. DUNN, M.D., PH.D.
Washington

BASIL C. MACLEAN, M.D., M.P.H.
New York City

MARTHA M. ELIOT, M.D., SC.D.
Washington

SEWARD E. MILLER, M.D.
Washington

HAROLD M. ERICKSON, M.D., M.P.H.
Portland, Oreg.

M. ALLEN POND, M.P.H.
Washington

U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

OVETA CULP HOBBY, *Secretary*

PUBLIC HEALTH SERVICE

LEONARD A. SCHEELE, *Surgeon General*

A review of what toxicologists and industrial hygienists are doing to develop threshold limits for concentrations of substances in the air, corresponding biological threshold limits, pretoxicosis tests, and prophylactic and antidotal agents . . . and a discussion of recent developments in the techniques of air sampling and air analysis.

Standards for Safeguarding the Health Of the Industrial Worker

By HERBERT E. STOKINGER, Ph.D.

THE EPITOMICAL STATEMENT made some years ago by Dr. James A. Sterner, now medical director of Eastman Kodak Co. and past president of the American Industrial Hygiene Association, announced a change of attitude among industrial hygienists which today is the keynote of enlightened occupational health practice: "No substance is so toxic that it cannot be used if sufficient knowledge of its action has been made available; similarly, no substance is so nontoxic that it should be used without regard to caution."

Currently, several effective means by which such a concept may be implemented are available: (a) threshold limits for concentrations of

injurious agents in the workroom air, (b) threshold limits of concentrations of injurious agents or their metabolic products in biological fluids corresponding to the threshold limits for air (biological threshold limits), (c) tests of pretoxicosis to screen persons for early signs of injury from exposure to hazardous agents, and (d) prophylactic and antidotal agents.

Occupational hygiene standards in this country have been given various names, the most familiar of which is maximal allowable concentrations. Another designation is threshold limit values, the name used by the American Conference of Governmental Industrial Hygienists. Still another term is industrial hygiene standards, a designation recently adopted by the American Standards Association. All these terms refer essentially to the same concept of permissible contamination of workroom air by dusts, fumes, mists, vapors, or gases, although the bases on which the limits for certain substances are set may differ somewhat in the different lists. The following discussion will be confined chiefly to the list of threshold limit values, with which the author is most familiar. This list is prepared by the American Conference of Governmental Industrial Hygienists' Committee on Threshold Limits, which is composed of persons work-

Dr. Stokinger is chief toxicologist, Occupational Health Program of the Public Health Service, Cincinnati, Ohio. He is a member of the Subcommittee on Toxicology, National Research Council; the Committee on Threshold Limits, American Conference of Governmental Industrial Hygienists; and the board of directors, American Industrial Hygiene Association; and a liaison member of the American Standards Association. Formerly, Dr. Stokinger was chief of the Industrial Hygiene Section, Atomic Energy Project, Rochester, N. Y.

ing in State and local industrial hygiene departments and in Federal industrial hygiene units, and members of the armed services in the United States and Canada.

Only the United States and Russia appear to be currently developing such lists as the threshold limits list, other countries preferring to use those already developed. Partly because of this, but more especially because the abbreviated preface to the list only briefly refers to its application, the following paragraphs discuss in some detail the nature of the list and its purpose, methods by which the values are developed, and interpretation and proper usage of the values.

Nature and Purpose of the List

The threshold limits list includes those natural minerals and oils and chemical substances, including economic poisons but excluding radioactive materials, in the form of dust, fume, mist, vapor or gas, which are in sufficiently wide use industrially to warrant control of their concentration in the breathing zone of the industrial worker. (Permissible levels of exposure to radioactive materials are independently set by various radiation protection committees throughout the world. Values for many radioactive substances may be found in the National Bureau of Standards Handbook No. 52.) Because of the rapid development and application of certain chemical substances, often a timelag occurs between the industrial use of a substance and the appearance of the threshold limit value. This interval, however, is becoming shorter as a result of increasing attention of the chemical industries to the development of data on the toxicity and hazards of their products prior to use. Limiting values assigned to each substance in the list represent the maximal atmospheric concentration to which workers may be exposed repeatedly day after day without injury to health.

The purpose of the list is to provide a limiting value of air concentration for injurious substances for use by plant engineers, industrial hygienists, and others concerned with the health and comfort of the workers. The list is intended to be a guide for the control of working atmospheres and to provide management,

labor unions, and the worker alike an assurance of healthful conditions on the job.

Development of Threshold Limits

A value for a toxic substance is assigned on the basis of data accumulated from animal inhalation toxicity studies and on the basis of industrial experience. Together, these represent, of course, ideal requirements not always fulfilled for each substance in the list but approximated as far as possible. Of the two, industrial experience is the test on which the validity of a value must ultimately rest. Because reliable information from industrial experience is frequently difficult to obtain, the Committee on Threshold Limits is often forced to rely on opinion of industrial hygienists, rather than on factual information, or sometimes, merely on animal data. Such opinions, however, are based on specific experience with various substances and come from occupational hygienists throughout the country. The current toxicological literature is also scanned continually for usable information. When the need for the assignment of a value seems urgent, a tentative value is assigned on the basis of the best information available at the time.

Originally, preventing impairment of health was virtually the only consideration in the selection of the proper limiting air concentration of an injurious substance. Now, however, with the increasing emphasis in occupational health on the "total man," more subtle effects on health, such as the effects of annoying or irritating agents, are also considered. Thus, whereas a threshold limit value of 3 or 4 p.p.m. for chlorine would insure no impairment of workers' health, this value is reduced to 1 p.p.m. in the interest of greater freedom from irritant effects. The levels of other gases and vapors with irritant or other discomforting effects on the workers have been similarly adjusted.

The rapid growth in the number and diversity of industrial substances to which workers are exposed and the increasing attention being given to occupational health in this country have given rise to a very real problem of maintaining the threshold limits list current. To meet this problem, the Committee on Threshold Limits reviews the lists annually, considering

carefully each value and any new information pertaining to a change in level. When a value is changed, it is so designated.

In the threshold limits list for 1954, a further accommodation has been made in an attempt to keep pace with the ever-increasing use of new industrial chemicals. This is the addition of a tentative list separated from the list of established values. Henceforth the tentative list will include all substances not previously listed. Because of the lesser certainty sometimes associated with these tentative values, they should provide only general guidance in the control of exposure and should carry no legal weight. The tentative list is looked upon as providing levels under trial and test, to be revised when new information justifies. Substances in the tentative list will not be incorporated in the main list until the values have been proved by experience to be acceptable. It is hoped that the tentative list will stimulate a greater number of yearly additions than in the past, as well as the critical evaluation of these values by greater numbers of industrial hygienists.

Overall Maximal Upper Limits

It is now considered desirable by a majority of the persons concerned with occupational health to assign a maximal upper limit of 1,000 p.p.m. for most, although not all, of the gases and vapors that are apparently nontoxic or nonhazardous. Such a limit has been set for certain Freons and other apparently innocuous substances, although it is known that neither health nor safety are endangered by exposure to far higher levels under ordinary conditions. In favor of this practice is the argument that it will prevent excessive or wanton exposure to air contaminants. It is recognized that all the facts needed to assure safety are seldom at hand. Physiologically inert substances, such as certain Freons and sulfur hexafluoride, in unlimited concentration may suddenly become hazardous, in the presence of welding or plumbing operations, through decomposition by heat to highly toxic products.

A similar concept is developing with respect to dusts that in the past have been considered

essentially nonhazardous or not incapacitating. Numerous reports from various countries make it all too apparent that many dusts formerly considered inert are capable of producing pulmonary changes that are oftentimes disabling (1-7). It would therefore seem that all insoluble dusts of whatever nature should be held suspect until proved otherwise (4). Unfortunately, the assignment of a specific level for each mineral dust is impossible at present. Mineral dusts are commonly of complex and inconstant composition, often varying according to locality, and thus are potentially capable of causing a variety of physiological responses. As a case in point, pulmonary carcinoma is commonly associated with the long-term inhalation of asbestos in England, but not in America (8). Assignment of specific levels is also difficult because pulmonary changes derived from the inhalation of mineral dusts commonly require years to assess, because sound information relating exposure to response is not, for the most part, available, because exposures are not uniform owing to changes in the industrial process and job changes, and because dusts from operations involving the same materials often differ in size and surface area.

Therefore, it is believed that the validity of the present standards for dust should be reviewed and consideration given to the following suggestions. In the absence of information and in view of the poor prospect of obtaining any in the near future, the conclusion seems inescapable that if protection from dusts is to be guided by hygienic standards, an overall limit value should be selected. Actually, two values appear desirable, one for dusts containing free silica, and another for nonsiliceous dusts.

For silica-bearing dusts, a limit of from 2 to 5 million particles per cubic foot (m.p.p.c.f.) is suggested. It would be applicable to those substances containing free silica of any appreciable percentage (10 percent or more). Such a level appears justifiable on the basis of usage and experience, as shown in table 1, and tacitly assumes no other mineral is more hazardous than silica and/or any combination of a mineral with silica. Actually, this value represents a rather low level of exposure when

expressed in terms of milligrams of substance per cubic meter of air. Depending upon particle size, 5 m.p.p.c.f. silicon dioxide (SiO_2) with a density of 2.2 might range from 0.01 or 0.02 milligram to several milligrams per cubic foot, assuming the general size distribution of industrial dusts thus far recorded by optical methods (9); with dusts differing in density from SiO_2 , corresponding differences in weight concentration, of course, would occur.

The question then arises of how best to express the dustiness of an atmosphere. Although this concerns matters too involved to be entered into here, it would seem that, with an absolute method now available for the measurement of industrial dusts, the limiting concentrations should be expressed in terms of either millions of particles per cubic foot or milligrams per cubic meter, or both, but within a definite size range, this range to be 0-3 μ diameter. Otherwise, dust counts, as well as expressions based on weight per volume of air, become meaningless. Particles of the size 3 μ and below can now be sampled and measured and are believed to be the only ones of hygienic significance. Whether the value approximating 5 m.p.p.c.f. will be found to hold when the submicroscopic particles are included is a very important project for future investigation.

Table 1. Recommended permissible limits of some silica-bearing dusts¹

Industry or source	Reported percent free SiO_2 ²	Recommended concentration m. p. c. f.
Sydney sandstone.....	90	³ 6
Silica brick.....	80	2
Gold mining (Union of South Africa).....	80	⁴ 3
Granite.....	35	9-20
Pottery.....	30	4
Gold mining (Ontario, Canada).....	25-35	⁴ 8.5
Pyrophyllite.....	30-40	10
Anthracite (hard rock).....	30	5-10
Nonferrous mines.....	20-40	5-10
Anthracite (haulageways).....	13	10-15
Cement.....	6	20

¹ From a table prepared by Theodore F. Hatch, professor of industrial hygiene, University of Pittsburgh.

² Values are approximate.

³ Owens Counter.

⁴ Konimeter.

A practical threshold limit value for non-siliceous dusts would appear to be 5 mg./m.³ This value has been in satisfactory use for some years for controlling hematite dust and fume in at least one American plant (10). It would seem to represent a reasonable level of dustiness for all other presently considered "inert" nonsiliceous inorganic dusts.

More Specific Designations

With increasing industrial hygiene knowledge and experience, refinements in designating specific substances to which values are assigned will assuredly follow. As yet, however, only a beginning has been made in this respect. For chromium, the designation specifically refers to chromic acid or to chromates. The highly poisonous arsine gas has a threshold limit value of 0.05 p.p.m., whereas the value for arsenic and its compounds is 0.5 mg./m.³ Differences in toxic action of uranium compounds have been recognized by individualizing the soluble and insoluble compounds.

It would appear that manganese dioxide would be a desirable designation for manganese, because manganese dioxide is the most common industrial hazard of this element. Mercury at 0.1 mg./m.³ should refer to mercury vapor and its inorganic compounds and should not imply inclusion of the more toxic organic mercurials. Similarly, for fluorides the newer organic fluorides which vary widely in toxicity and hazard should be explicitly excluded, and for selenium, the threshold limit should apply only to selenium compounds which are highly toxic, not to elemental selenium dust, which is essentially nontoxic. The value of 0.1 mg./m.³ for cadmium should refer specifically to the cadmium fume, for use of this limit for most of the insoluble cadmium compounds imposes far too severe a restriction. Different levels for lead and its compounds should be specifically defined according to information accumulated in the lead industries in this country over the past 10 years. Data show that whereas there is no reason to alter the value of 0.15 mg./m.³ for lead fume or for lead dust of submicroscopic size, this value is unrealistically severe when applied to the more insoluble lead salts, and probably too lenient if applied to certain or-

ganic lead compounds. These and other desirable refinements in the list will undoubtedly be made in the near future.

Biological Threshold Limits

One new feature of occupational health standards that appears destined to play a useful role in evaluating personnel exposure in industry is what might be called biological threshold values, for want of a better term. These values refer at the present time to the greatest permissible content of an air contaminant or its metabolic derivatives in the body fluids, usually in blood or urine, although changes in other bodily constituents may in time serve also as measures of exposure. A list of biological threshold values, which correspond to the threshold limits for concentrations of the substances in air, is given in table 2. The values given for some of the substances are tentative, having been derived from limited experience; for others, such as lead and fluorine, the values are well founded. For still others, such as arsenic and mercury, there is considerable disagreement among industrial hygienists as to the usefulness of urinary determinations.

It is probable that the biological threshold limits of only a few selected substances will ultimately find an accepted place in occupational hygiene standards, since all substances are not amenable to accurate analysis in body fluids (complex organic molecules) by reason of wide individual variation in metabolism, interferences from dietary sources (arsenic), or simply the relative absence of constituents in easily obtainable body fluids (chromium, manganese, silver, and probably beryllium). For biological values to be serviceable, repeated determinations must be made on each person exposed, and preexposure control determinations are desirable. When biological threshold limits are used, they should supplement determinations of air concentrations, not replace them. In effect, these biological limits substitute diagnosis for the control or prevention of injury provided by air analysis.

Currently, in the lead industry, considerable enthusiasm is being expressed over the ap-

Table 2. Biological threshold limits ¹

Substance	Blood (mg./ 100 ml.)	Urine (mg./l.)
Inorganic constituents		
Arsenic		1 ² (0.5 for arsine or lewisite).
Beryllium		0.002.
Cadmium		0.1.
Copper	0.1	
Chromium		Any detectable amount.
Lead	0.08	0.2.
Mercury		0.25. ³
Manganese ⁴		0.001.
Thorium		Not eliminated in chem- ically measurable amounts.
Vanadium		0.05. ⁵
Uranium		0.01. ⁵
Fluoride		4.
Selenium		0.07.
Tellurium		0.01.
Organic constituents		
Benzene		15 percent below normal sulfate ratio of inor- ganic to total sulfate.
Bromide	100	
Carbon disulfide		0.15.
Dinitro- <i>o</i> -cresol		5.
Methyl alcohol		5-7.
Methyl acetate		Analyzed as methyl al- cohol.
Toluene (as hippuric acid).		3,000.
Trichloroethylene (as trichloroacetic acid).		75.

¹ Many of the values given here are found in or have been revised from Chemistry of Industrial Toxicology by H. B. Elkins, New York City, Wiley, 1950, and in Analyses of Biological Materials as Indices of Exposure to Organic Solvents by Elkins, A. M. A. Arch. Indust. Hyg. and Occup. M. 9: 212-222, March 1954.

² H. H. Schrenk, in New Information on Arsenic Trioxide, Ind. Eng. Chem. 45: 11A (1953), states that urinary arsenic values of 4-5 mg./l. are commonly not associated with signs of arsenic poisoning. Use of urinary values is considered of doubtful worth because of great variation in normal values. Dietary arsenic, such as that obtained from seafoods, would greatly alter the urinary arsenic picture; moreover, arsenic is excreted chiefly in the feces.

³ Urinary values may not always be reliable in long-term exposures owing to possibility of development of lower nephron nephrosis and for other reasons.

⁴ Inasmuch as manganese is eliminated chiefly via the intestine, urinary determination is not a particularly valuable indicator of exposure.

⁵ Tentative value.

parently successful use of urinary lead values with or without prior screening by urinary coproporphyrin determinations. The argument in favor of the use of urinary values is that in practice most industrial exposures are neither uniform nor simple, but are mixed, and, therefore, that the body serves as a better sampling device and indicator of this type of exposure than do air samples. Biological determinations also offer a guide in the diagnosis of illness not provided by air analysis. Whether it is a wise decision to allow the individual to serve as his own indicator of exposure is debatable: Derangement of metabolic function or excretion for various causes is not uncommon among working populations, especially in older age groups, and concomitant exposure to other substances or other stresses may deflect normal metabolic pathways. It would appear reasonable, for the present at least, that biological values should be accompanied by one other independent method of evaluating the working environment.

Interpretation and Use

After the threshold limits have been accepted, it is most important that they be properly interpreted and used. Because there is some lack of agreement among industrial hygienists as to the use of the values, it might be worthwhile to consider what is meant by threshold limit or maximal allowable concentration. Confusion appears to center on the precise meaning of the term "threshold" or what constitutes "maximal allowable." These are brief terms used to express a rather complex and abstract concept which may be explained philosophically and operationally.

Philosophically, the threshold limit represents a level to which a normal healthy worker may be exposed for 8 hours each workday without harm to his physical or mental well-being. Because, in practice, most situations involve intermittent or varying exposures, the concept of the limit is that the summation of physiological effects of such exposures shall not be greater than the effect of exposure to a constant concentration at the level of the limit.

Operationally, the word limit refers to the highest permitted averaged values of an agent

in the workroom air that have been obtained in a complete cycle of operations during the day. Proper averaging of concentrations should take into consideration the duration of exposure at each concentration; this is referred to as a "weighted average." Concentrations far above the limit for periods of 30 minutes or more and prevailing sporadically throughout the day, although possibly equaling the threshold limit, are not within the intended meaning of the term. Such levels come under the classification of acute, high exposures, and suitable measures should be taken to bring such levels in line with the accepted limit. Threshold limit values are not based on high, acute levels superimposed on a persistent lower level irrespective of what value their average is.

Threshold limit values should be used as guides in the control of health hazards and should not be regarded as fine lines between safe and dangerous concentrations, that is, a point above which injury is bound to occur and below which complete safety may be expected for all exposed persons. Competent judgment is required here as in the interpretation of any standard.

Misuse of Limits

The threshold limit values should be used only for control of exposure atmospheres for repeated 8-hour working days. They should not be used in the following ways:

1. For brief acute exposures. (The threshold limit values have been set on the basis of chronic exposures, not on the basis of brief acute exposures.)
2. For mixtures of substances. (There is no assurance that mixtures may not have potentiated and enhanced effects greater than the summated effects of each component.)
3. As levels for community air pollution or for levels to be derived therefrom by simple extrapolation. (The threshold limits have been set on the basis of an 8-hour exposure day with the assumption that a subsequent 16-hour period of nonexposure will aid distribution and elimination of the toxic agent from the body; therefore, they cannot apply to 24-hour continuous exposures common in air pollution conditions.)

4. As levels of permissible concentrations in community water supplies or for substances in solution. (Appropriate levels have been fixed specifically for several toxic elements in potable waters.)

5. As the basis for selecting dangerous compounds for labeling. (Hazards involved in handling chemicals frequently arise from routes other than inhalation, which is the basis for threshold limits.)

6. As safe limits for flight personnel in aviation. (Higher standards of safety and performance are required, and degree and duration of exposure at flight altitude differ from the degree and duration at sea level.)

Pretoxicosis Tests

Closely related to the biological threshold values are tests of pretoxicosis, the detection of subtle metabolic changes in the body before injury of serious proportions has developed. The idea is not new, the first reported test of this sort having been applied to the hematologic reactions of presaturnism by Heim de Balsac in 1908 (11). Although the determination of pretoxic reaction is unquestionably one of the highly desirable goals of the industrial toxicologist, few such tests have been developed mainly because the mechanism of action of most toxic agents on which such tests are based is not generally known.

A pretoxicosis test for carbon disulfide has been reported by Bourguignon (12). This test is based on the change in chronaxie, which, in turn, depends upon the knowledge of the vascular and neurologic changes caused by carbon disulfide during the early stages of injury. Chronaxie, by definition, is the minimal time that an electric current of standard strength is required for the excitation of the tissue. Bourguignon's report indicates that after men had been exposed to carbon disulfide for only 2 months and before any clinical signs of disease were manifest, their chronaxie changed. Accordingly, this test permitted early detection of intoxication by carbon disulfide.

Another test of pretoxicosis that is promising although it is still in the developmental stage is the lowered cystine content of fingernails of individuals exposed to vanadium. The

lowered content occurs in the absence of any objective or subjective signs or symptoms in the workers, and it has been experimentally demonstrated in the hair of animals ingesting vanadium compounds in amounts that caused no demonstrable signs of toxicity (13). When used in combination with urinary vanadium determinations, the test appears to be highly suggestive of early metabolic changes resulting from exposure to vanadium.

The well-known urinary coproporphyrin III screening test for lead poisoning might well be classed as a pretoxicosis test. Used in combination with urinary lead values, it is now considered a reliable guide to incipient damage by lead (14). At potentially harmful body levels, lead is believed (15) to convert more of the normally occurring colorless precursor to the chromogen while increasing the total coproporphyrin of the urine.

The relative paucity of such procedures attests to the extreme difficulty of their development. Investigators should be encouraged to develop this aspect of preventive medicine, however, because its value obviously transcends that of diagnostic tests of established disease.

Prophylactic and Antidotal Agents

As the realization of the importance of toxicology in the development and safe use of industrial chemicals has widened, more diversified groups of scientists have become attracted to its problems. Such attraction has resulted in the development of a metal complexing agent, the calcium salt of ethylene diamine tetraacetic acid (CaEDTA), for the treatment of lead poisoning (16). This chelating agent has been given good evidence of effectiveness in numerous clinical trials (17, 18), and it gives promise of considerable versatility. It has been found, for example, to be a satisfactory antidote in experimental vanadium poisoning (19) and to give promise in the treatment of essential hypertension (20). Further use of CaEDTA for the more rapid elimination of other toxic metals having the capacity to complex firmly with this chelating agent at body pH conditions will undoubtedly be made. Since the advent of BAL (2, 3-Dimercaptopropanol) for combating arsenic poisoning, no

other organic complexing agent has proved of such value, although others, such as aurin tricarboxylic acid for the elimination of beryllium (21), have been suggested from time to time.

An ingenious and novel use of a complexing agent for combating cyanide poisoning has been recently reported (22). Cyanideless vitamin B₁₂ (vitamin B₁₂^a, hydroxo-cobalamin) is capable of tightly coordinating with the cyanide ion in experimentally poisoned animals and thus preventing toxic symptoms and death.

Well-known reducing agents, such as ascorbic acid, have been reported experimentally at least to be effective prophylactically against a variety of toxic agents. For example, vitamin C was shown to function as effectively as CaEDTA against vanadium poisoning in animals (19), and this vitamin is reported (23) to reduce substantially fatal pulmonary edema and hemorrhage in animals inhaling ozone or nitrogen dioxide. Essentially complete protection against fatal ozone exposures in animals was afforded by a mixture of such reducing substances as glucuronate, cystine, and other similar substances that include vitamin C.

Two-carbon fragments administered as ethanol, acetate, and propanol have been reported to be capable of combating the highly toxic fluoracetate (1080) in animals (24), and they give promise of successful therapy for this poison. Cystine, methionine, and other sulfur-containing amino acids have been suggested as more general aids to the detoxifying capacity of the liver for protecting animals against the toxicity of 1,2-dichloroethane (25) and methylchloride (26).

Within the last few years, atropine has proved an effective antidote for parathion and other closely related organic phosphorous insecticides.

Air Sampling and Analysis

The development of valid threshold limit values goes hand in hand with the development of accurate procedures for sampling and analysis of the industrial atmospheric contaminants.

The Millipore Filter

Unquestionably, the greatest boon in recent years to such a development has been the introduction into the field of industrial hygiene of the Millipore filter (27, 28), known also as the membrane filter or molecular filter. This filter has an efficiency of sampling airborne particulates approaching 100 percent for all particle sizes of hygienic significance. The 150 μ thick paper of cellulose acetates and nitrates with 80 to 85 percent voids possesses a high dielectric constant and effectively attracts even noncharged particles of infinitely small size to its surface despite a mean pore size of 0.8 μ . Thus, the paper possesses a collection efficiency independent of the particle size of the aerosol. A limitation of the paper is that oils and tars clog the filter in a very short period of time, making it useless as a sampling medium for these materials.

Valuable use may be made of the property of the membrane to become transparent upon the addition of a limited amount of solvent (acetone, acetates, alcohols). This transparency permits the collected air sample to be directly counted under the optical microscope over a circumscribed, known area of the filter, thus providing a permanent dust mount that may be quantitatively analyzed.

Further advantage has been taken of the solubility characteristics of the Millipore filter by Fraser (29), who combined the high sampling efficiency of the paper and its solubility properties with electron microscopy to develop for the first time an absolute method of sampling and analyzing solid airborne particulates. In outline, the procedure consists of (a) collecting a sample of airborne particulates on the Millipore filter, (b) effecting transfer of the particles to a prepared electron microscope specimen screen after solution of the paper, (c) photographing the particles, and (d) determining the size distribution of the particles by visual measurement from their projection on a screen.

It is strongly urged that industrial hygienists take advantage of this powerful technique to explore the heretofore unsampled and unseen particles of industrial atmospheres and use such information to aid in the determination of their

industrial health significance. The results of such a study could well revise some of our concepts of the effective number of particles required to produce pneumoconiosis.

In the light of this and other recent developments, the Engineering Section of the Occupational Health Field Headquarters, Public Health Service, has undertaken an extensive reinvestigation of the entire field of dust sampling and measurement with the objective of developing improved generally acceptable methods that incorporate the advantages of these advances. Already the investigation has led to a promising use of the transparent properties of the Millipore filter, referred to above, as a dry, permanently fixed, dust sample for on-the-site use in plant or factory.

An automatic instrument which continuously records the mass concentration of dust in the atmosphere has recently been introduced (30). This instrument is based on the photoelectric measurement of forward-scattered light from solid or liquid aerosols and has a range from 10^{-3} to 10^{-2} $\mu\text{g./l.}$ in terms of dioctyl phthalate as 0.3μ diameter droplets. A further modification of this device is being undertaken by David Sinclair of the Johns-Manville Research Center in the development of an instrument which will indicate the size of the particulates as well as their concentration by electronically computing the ratio of backward and forward scattered light from the particles.

Another development in dust analysis techniques is the use of the electron microscope as an electron diffracting instrument. This technique is capable of exploring the surface of particles to the depth of approximately 0.05μ in respect to their crystallinity or lack of it. In conjunction with X-ray diffraction techniques which determine similar properties within the core of the particle, it may provide much useful information concerning the relation between the physical structure of dust and its physiological effects. At the Occupational Health Field Headquarters, such work is being done on the various forms of diatomaceous earths, and in Scotland, on various types of silica (31). Efforts along this line are expected to go far in helping elucidate the etiology of various types of pneumoconiosis.

Vapors and Gases

Developments in sampling and analysis in the highly individualized field of vapors and gases during recent years have yielded no new principle or device, but rather they have found application for many of the methods long used in other fields. The study of air pollution has given a sudden impetus in this direction. Among the recent innovations used in the air pollution field are the portable Venturi scrubber (32), which has proved satisfactory for sampling ammonia, nitrogen oxides, aldehydes and sulfur dioxide, freeze-out trains, large-capacity plastic bags, silica gel, and other solid absorbents (33).

For the analysis of organic pollutants, the infrared analyzer and the mass spectrometer are being explored rather widely. Chromatographic procedures have also aided in the confirmation of many often closely related organic substances present in the air.

Automation appears to be the only really new basic development in this field in recent years. This principle has been most successfully applied to the measurement of sulfur dioxide in the form of the Thomas Autometer (34). This instrument is especially useful in situations where round-the-clock measurements are needed, or with further attachments for signaling added, it may be used successfully for control of gaseous concentrations. Automatic analyzers have also been developed for halogen analysis, for carbon monoxide (35), and for other substances. It should be emphasized that such automatic recorders in their present state of development require careful standardization and repeated attention and maintenance to assure faithful recording of actual concentrations. Commercially available recorders vary widely in this respect. If original design has been good and the instrument carefully standardized and maintained, the saving to industry over the years far outweighs the relatively high initial cost. Increasing automation is foreseen for the coming years in this and related fields of analysis and control of air concentrations of contaminants.

It may seem unfortunate that many of the recent developments in the industrial hygiene field often involve the use of equipment that is

expensive and nonportable. Immobility, but not expense, is fast being overcome when the need demands. A mobile infrared analyzer has been designed (36) and a portable mass spectrometer as well (37). High cost, a factor necessarily associated with increased complexity and sensitivity, will be slower to be overcome.

• • •

Copies of the American Conference of Governmental Industrial Hygienists' list of threshold limit values may be obtained from Allan L. Coleman, chairman of the Committee on Threshold Limits, Connecticut State Department of Health, Hartford 6, Conn.

REFERENCES

- (1) Dunner, L., and Hicks, M. S.: Bronchial carcinoma (and pneumoconiosis) in dusty occupations: Observations in boiler scalers and grain dockers. *Brit. J. Tuberc.* 47: 145-149, July 1953.
- (2) Ruttner, J. R.: Foundry workers' pneumoconiosis in Switzerland (anthracosilicosis). *A. M. A. Arch. Indust. Hyg. and Occup. M.* 9: 297-305, April 1954.
- (3) India. Office of Chief Adviser Factories: Silicosis in mica mining in Bihar. Report No. 3. New Delhi, The Office, 1953.
- (4) Marchan, D. M.: Pneumoconiosis without fibrosis. *Arch. hig. rada* 4: 402 (1953).
- (5) Martin, J. E., Jr.: Coal miners' pneumoconiosis. *Am. J. Pub. Health* 44: 581-591 (1954).
- (6) Abrams, H. K.: Diatomaceous earth pneumoconiosis. *Am. J. Pub. Health* 44: 592-599 (1954).
- (7) Smart, R. H., and Anderson, W. M.: Pneumoconiosis due to diatomaceous earth. *Indust. Med. & Surg.* 21: 509-518, November 1952.
- (8) Lanza, A. J.: Asbestosis. In Papers presented at the Fourth Conference of the McIntyre Research Association on silicosis and aluminum therapy. Norando, Canada, Norando Mines, Ltd., Jan. 1952.
- (9) Bloomfield, J. J., and Dalla Valle, J. M.: Determination and control of industrial dust. *Pub. Health Bull.* 217. Washington, D. C., U. S. Government Printing Office, 1935.
- (10) Weber, H. J.: Threshold limits of metal fumes. Part of a panel discussion at the annual meeting of the American Industrial Hygiene Association, Chicago, Apr. 27, 1954.
- (11) Heim de Balsac et Agasse-La Font: Le depistage du saturisme latent par l'examen du sang. *Bull. Acad. Med.*, 1908, p. 1469.
- (12) Bourguignon, G.: Apparition d'altérations de la chromaxie avant toute manifestation clinique dans un cas d'intoxication sulfo-carbonée professionnelle. Introduction à l'étude des prétoxicoses. *Bull. Acad. nat. méd.* 134: 287, 289 (1950).
- (13) Mountain, J. T., Delker, L. L., and Stokinger, H. E.: Studies in vanadium toxicology. I. Reduction in the cystine content of the rat hair. *A. M. A. Arch. Indust. Hyg. & Occup. M.* 8: 406-411, November 1953.
- (14) Harold, G. C., Meek, S. F., and Padden, D. A.: A coproporphyrin III test as a measure of lead damage. Considering lead dust of relatively large particle size. *A. M. A. Arch. Indust. Hyg. and Occup. M.* 6: 24-31, July 1952.
- (15) Brigatti, L., and Grandes, C.: Sulla presenza di un precursore eterosolubile delle profirine nelle urine di addetti alla lavorazione con piombo [Presence of ether soluble precursor of porphyrin in urine in workers exposed to lead]. *Med. lavoro* 44: 113-123, March 1953.
- (16) Rubin, M., Gignac, S., Bessman, S. P., and Belknap, E. L.: Enhancement of lead excretion in humans by disodium calcium ethylenediamine tetraacetate. *Science* 117: 659-660, June 12, 1953.
- (17) Cotter, L. H.: Treatment of lead poisoning by chelation. *J. A. M. A.* 155: 906-908 (1954).
- (18) Hardy, H. L., Elkins, H. B., Ruatola, B. P. W., and Quinby, J.: Use of monocalcium disodium ethylene diamine tetra-acetate in lead poisoning. *J. A. M. A.* 154: 1171-1175, April 3, 1954.
- (19) Mitchell, W. G., and Floyd, E. P.: Ascorbic acid and ethylene diamine tetra-acetate as antidotes in experimental vanadium poisoning. *Proc. Soc. Exper. Biol.* 85: 206-208, February 1954.
- (20) Popovici, A., Geschickter, C. S., and Rubin, M.: Treatment of essential hypertension by magnesium chelate solution. *Bull. Georgetown Univ. Med. Center* 5: 108-116, October-November, 1951.
- (21) White, M. R., Finkel, A. J., and Schubert, J.: Protection against experimental beryllium poisoning by aurin tricarboxylic acid. *J. Pharmacol. & Exper. Therap.* 102: 88-93 (1951).
- (22) Mushett, C. W., Kelley, K. L., Boxer, G. E., and Richards, J. C.: Antidotal efficacy of vitamin B₁₂^a (hydroxocobalamin) in experimental cyanide poisoning. *Proc. Soc. Exper. Biol. & Med.* 81: 234-237, October 1952.
- (23) Stokinger, H. E., and others: Toxicity of ozone. Report delivered at the annual meeting of the American Industrial Hygiene Association, Chicago, April 27, 1954.
- (24) Fawaz, G., and Fawaz, E. N.: Effect of metabolites on accumulation of citric acid in fluoroacetate-poisoned rats. *Proc. Soc. Exper. Biol.* 84: 680-684 (1953).
- (25) Heppel, L. A., Porterfield, V. T., and Sharpless, N. E.: Toxicology of 1,2-dichloroethane (ethylene dichloride); Its detoxication by L-cystine,

- DL-methionine and certain other sulfur containing compounds. *J. Pharmacol. & Exper. Therap.* 91: 385-394, December 1947.
- (26) Smith, W. W.: Relationship between protein and sulfur-containing amino acids in protection against methylchloride poisoning (abstract). *Federation Proc.* 6: 206 (1947).
- (27) Goetz, A.: Application of molecular filter membranes to the analysis of aerosols. *Am. J. Pub. Health* 43: 150-157 (1953).
- (28) First, M. W., and Silverman, L.: Air sampling with membrane filters. *A. M. A. Arch. Indust. Hyg. and Occup. M.* 7: 1-11, January 1953.
- (29) Fraser, D. A.: Absolute method of sampling and measurement of solid air-borne particulates: Combined use of the molecular filter membrane and electron microscopy. *A. M. A. Arch. Indust. Hyg. and Occup. M.* 8: 412-419, October 1953.
- (30) Sinclair, D.: Light scattering instruments as an aid in air pollution measurements. *Air Repair* 3: 51-56, August 1953.
- (31) Gibb, J. G., Ritchie, P. D., and Sharp, J. W.: Physicochemical studies on dusts. VI. Electronoptical examination of finely ground silica. *J. Appl. Chem.* 3: 213-218, May 1953.
- (32) Magill, P. L., and others: Sampling certain atmospheric contaminants by small-scale Venturi scrubber. *Analyt. Chem.* 22: 1174-1177, September 1950.
- (33) Stanford Research Institute, Stanford University: The smog problem in Los Angeles County, 1950. Third interim report. Los Angeles, Western Oil and Gas Association, 1951, Appendix A.
- (34) Washburn, H. W., and Austin, R. R.: Continuous measurement of sulfur dioxide and hydrogen sulfide concentrations by automatic titration. In *Proc. U. S. Technical Conference on Air Pollution*. New York, McGraw-Hill, 1950, pp. 580; 556, 567.
- (35) Randall, R. A., and Hunstad, N. A.: Reliability of combustible gas alarms. Report delivered at the annual meeting of the American Industrial Hygiene Association, Chicago, April 27, 1954.
- (36) Chapman, R. L., and Torley, R. E.: Mobile infrared spectrometer for rapid on-the-spot analysis. *Analyt. Chem.* 22: 987-990, August 1950.
- (37) Miller, F., and others: Alveolar ventilation studies using the mass spectrometer. *Proc. Soc. Exper. Biol.* 74: 13 (1950).

Community Health Week, March 21-27

Community Health Week programs are recommended for March 21-27, 1955, by the United States Junior Chamber of Commerce in cooperation with the National Health Council.

Chapters of the Junior Chamber of Commerce have been asked by their national officers to name program chairmen for Community Health Week and to seek the aid of local health leaders. The program theme is "Know Your Community Health Resources."

Voluntary organizations are recommending that their affiliates provide the programs with cooperation and guidance. Basic health services will figure in programs where local public health units work with interested members of the organization.

Interested chapters will obtain a kit of aids from the national office. Suggested activities include health fairs and forums, special newspaper coverage, television and radio programs, exhibits, and school health projects.

Program leaders may wish to consult *Guide to Health Organizations in the United States, 1951*, by Joseph W. Mountin and Evelyn Flook. Public Health Service Publication No. 196. Available from the Superintendent of Documents, Washington 25, D. C. 30 cents.

Histoplasmin, Coccidioidin, And Tuberculin Sensitivity Among School Children In Two Texas Counties

By MICHAEL L. FURCOLOW, M.D.,
CHARLES F. FEDERSPIEL, M.A., and
HOWARD W. LARSH, Ph.D.

Although the general areas of histoplasmosis and coccidioidomycosis prevalence are well known, few studies of these diseases have been made in areas where both exist. Reactors to histoplasmin and coccidioidin, as well as tuberculin, among a group of Texas school children are reported in this study.

THE ENDEMIC areas of histoplasmosis and coccidioidomycosis appear to extend into Texas, the former from the northeast, the latter from the southwest. Observations on histoplasmin sensitivity in Texas indicate approximately 30 percent of the young adults are positive histoplasmin reactors. Among 209 lifetime residents of Texas attending the University of Chicago from 1946 to 1948, 61, or 29 percent, were found to be positive reactors to the histoplasmin skin test (1). Palmer's survey

Dr. Furcolow is medical officer in charge at the Communicable Disease Center's Kansas City Field Station, University of Kansas Medical Center. Dr. Larsh, professor and chairman of the department of plant sciences, University of Oklahoma, serves as special consultant in mycology at the field station. Mr. Federspiel, formerly statistician at the Communicable Disease Center, Public Health Service, Atlanta, Ga., is now graduate assistant, Institute of Statistics, North Carolina State College, Raleigh, N. C.

among student nurses yielded 21 positive reactors, 34 percent, of the 61 Texans tested (2). In a survey at Vanderbilt University, Christie and Peterson reported 7 positive histoplasmin reactors, 26 percent, among the 27 Texas residents tested (3).

These investigators made no effort to divide Texas into areas of histoplasmin sensitivity, but considered the State as a whole. The only report of a survey in a specific area is that of Forbes and Chang (4), who tested 441 infants and children in Dallas hospitals. This report showed a rise in sensitivity rates with age, reaching about 17 percent in the 12- to 15-year group. Since illness decreases skin sensitivity, it is probable that sensitivity among healthy children in this area would be higher.

In 1953, a survey of histoplasmosis and coccidioidomycosis in Texas was stimulated by the United States Army, which was concerned with the prevalence of fungus diseases in the area about Fort Hood where large numbers of men are trained. The location of Fort Hood and its relation to Bell and Coryell Counties are shown in figure 1. Tests were given only in Gatesville in Coryell County and Killeen in Bell County. These towns are at opposite ends of Fort Hood and are considered representative of the two counties. Landscape and climate are similar throughout the area.

Tuberculin tests were done also to furnish data to compare with similar surveys in other parts of the United States. In addition to the skin testing, a 35-mm. X-ray of the chest was obtained for each individual. A portable X-ray unit was used. The films were read by H. E. Smith of the Texas State Department of Health. Results of the X-ray survey are not considered in this paper.

Materials and Methods

The study was conducted between May 4-7, 1953. Tuberculin, histoplasmin, and coccidioidin tests were done simultaneously by intradermal injection of 0.1 cc. of the appropriate antigen. The tuberculin and coccidioidin tests

were placed on the volar surface of the left forearm, and the histoplasmin test was similarly placed on the right forearm. The injections were given by teams of three experienced persons, each using a separate set of syringes and needles and each injecting a single antigen. The tests were inspected 48 hours after injection, and measurements of the transverse diameter of erythema and induration were made by two experienced readers. Reactions were considered positive if the area of induration was 5 mm. or more in diameter without regard to erythema.

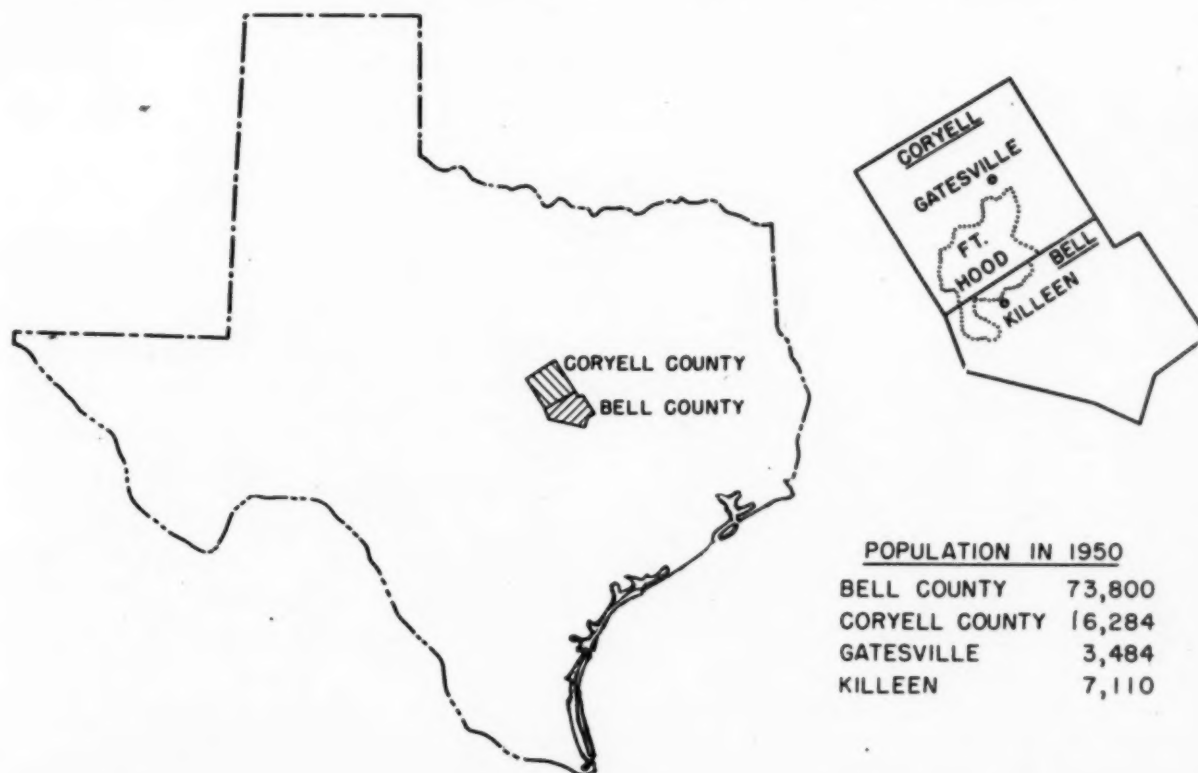
The tuberculin dosage was 0.0001 mg. in 0.1 cc. of diluent. The histoplasmin (lot HKC-5) prepared and titrated by the methods of Shaw, Howell, and Weiss (5), was administered in a dilution of 2:1000. This histoplasmin and dilution are equivalent in potency to earlier products (1, 2). The coccidioidin was used in a dilution of 1:100.

A questionnaire, including parental consent form, was distributed to each student prior to the test. This form included identifying in-

formation, date of birth, sex, length of residence in Bell and Coryell Counties, and appropriate space for recording the results of the skin tests and the X-ray number. On completion of the survey these records were transferred to punchcards from which the desired tabulations were obtained.

Skin tests were given to 2,838 persons in the public schools at Gatesville and Killeen, Tex. Twenty nonwhite persons and 109 adults were eliminated from the analysis, leaving a total of 2,709. All of these children were considered in the analysis of the tuberculin results. Lifetime residents only were considered in analyzing the results of the histoplasmin and coccidioidin tests. Any person living at least 80 percent of his life in the Bell-Coryell County area was considered a lifetime resident. This criterion eliminated approximately half of those tested, since the children of army personnel at Fort Hood, a rather transient group, constituted a large proportion of the total school population. The data analyzed for histoplasmin and coccidioidin sensitivity, then,

Figure 1. Area of residence of persons given skin tests in Bell and Coryell Counties, Tex.



represents the indigenous population of Bell and Coryell Counties, essentially a rural area.

As used in the text, "rates" or "sensitivity rates" refer to the prevalence of positive reactors to the various antigens.

Results

Differences between schools. The number and percent of positive reactors to histoplasmin in the Gatesville and Killeen public schools are shown in table 1 and figure 2. Since the towns are approximately 30 miles apart, it was considered desirable to compare the sensitivity rates. As the rates for the two schools were approximately the same, for purposes of analysis, the results from the two areas were combined.

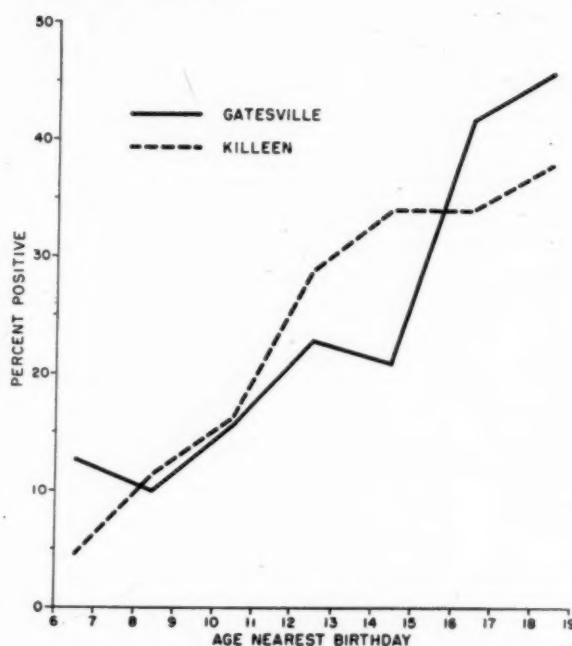
Table 1. Histoplasmin sensitivity prevalence among Gatesville and Killeen lifetime resident public school children, Tex.

Age nearest birthday	Gatesville			Killeen		
	Number tested	Number positive	Percent positive	Number tested	Number positive	Percent positive
6-7	79	10	12.7	67	3	4.5
8-9	141	14	9.9	131	15	11.5
10-11	129	20	15.5	148	24	16.2
12-13	101	23	22.8	139	40	28.8
14-15	96	20	20.8	109	37	33.9
16-17	53	22	41.5	115	39	33.9
18-19	22	10	45.5	53	20	37.7
Total	621	119	19.2	762	178	23.4

Tuberculin sensitivity. Table 2 and figure 3 show the number and percent of positive reactors among the 2,709 white children tested. The rates were relatively low, rising from 1.8 in the 6- to 7-year age group to 6.1 in the 16- to 17-year age group. There was a clear-cut rise in rates with age. The overall rate was 4.0 percent. Four of the 18 Negro children tested were positive to tuberculin.

Histoplasmin sensitivity. The data on the frequency of positive reactions to histoplasmin are given in table 3 and figure 3. These data, confined to the 1,383 white lifetime residents tested, show progressively increasing rates of

Figure 2. Prevalence of histoplasmin sensitivity among lifetime residents in Gatesville and Killeen schools, Tex.



sensitivity with age. The 6- to 7-year age group had 8.9 percent positive and the oldest age group, 18- to 19-year olds, had 40.0 percent positive reactors. The overall percentage of positive reactors was 21.5 percent.

Coccidioidin sensitivity. Few of the lifetime residents of Bell and Coryell Counties reacted to this antigen (table 3 and fig. 3). Although the rates were low, they were based on a relatively large sample and show a tendency to increase with age, from less than 1 to almost 3 percent. The low rates of sensitivity

Table 2. Number and percent positive tuberculin reactors among white school children in Bell and Coryell Counties, Tex.

Age nearest birthday	Number tested	Number positive	Percent positive
6-7	325	6	1.8
8-9	578	16	2.8
10-11	581	27	4.7
12-13	448	19	4.2
14-15	379	17	4.5
16-17	279	17	6.1
18-19	119	7	5.9
Total	2,709	109	4.0

to coccidioidin suggest that coccidioidomycosis is not endemic in this region of Texas. A number of coccidioidin reactors were noted among the "nonlifetime" residents. These occurred among persons whose major residence had been in western Texas.

Sex differences in histoplasmin sensitivity. The positive reactions among males and females are shown in table 4 and figure 4. The overall frequency was higher among males than females (26 versus 17 percent). This has been noted in other surveys (6, 7). However, the rates were essentially equal up to the 12- to 13-year age group. Another difference between the male and female rates was the failure of the female rates to show a marked increase with age beyond the 10- to 11-year group. In fact, the rates for females above this age were almost constant. The only rise occurred in the 18- to 19-year group, where only 29 girls were tested. The reasons for these sex differences are not known.

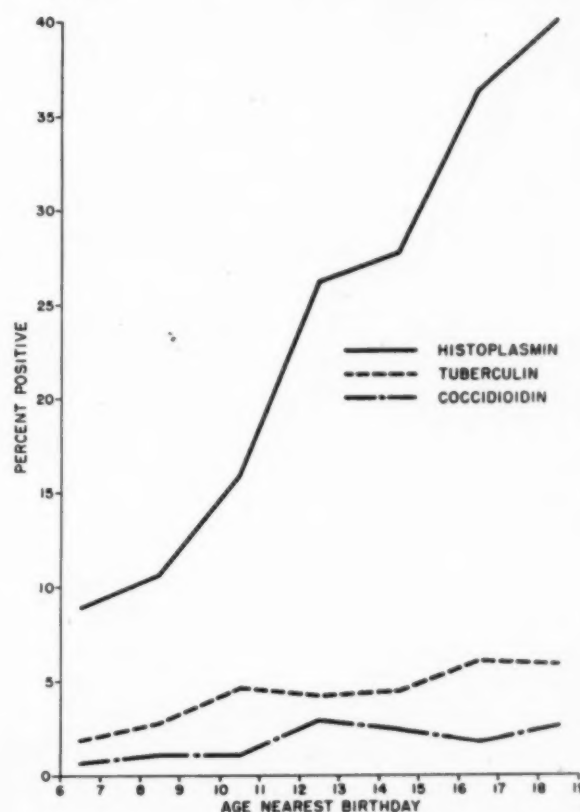
Cross reactions. Cross reactions in patients tested with histoplasmin and coccidioidin have been reported (8). The comparison of the size of the reaction to histoplasmin and to coccidioidin in the same children is shown in table 5. It appears that some of the coccidioidin reactions were cross reactions. This was indicated by the number of children who showed a smaller reaction to coccidioidin than to histoplasmin.

Table 3. Number and percent positive reactors to histoplasmin and coccidioidin among lifetime residents of Bell and Coryell Counties, Tex.

Age nearest birthday	Number tested	Histoplasmin		Coccidioidin	
		Number positive	Percent positive	Number positive	Percent positive
6-7	146	13	8.9	1	0.7
8-9	272	29	10.7	3	1.1
10-11	277	44	15.9	3	1.1
12-13	240	63	26.3	7	2.9
14-15	205	57	27.8	5	2.4
16-17	168	61	36.3	3	1.8
18-19	75	30	40.0	2	2.7
Total	1,383	297	21.5	24	1.7

¹ One child in this group was tested with histoplasmin but not with coccidioidin.

Figure 3. Prevalence of histoplasmin and coccidioidin sensitivity among lifetime resident school children, and of tuberculin sensitivity in all school children, Bell and Coryell Counties, Tex.



Many of the coccidioidin reactions were specific reactions and not cross reactions. This was clearly shown in the 52 children who reacted to coccidioidin but were negative to histoplasmin. Of these, 14 were positive reactors. In 13 other children, the reactions to coccidioidin were larger than to histoplasmin.

Discussion

Although the purpose of this survey was to determine the prevalence of sensitivity of histoplasmin and coccidioidin, the tuberculin rates also proved interesting. The tuberculin rates among children in this rural area of Texas were surprisingly high. In comparing rates obtained under similar circumstances with the same lot and dose of tuberculin, the Texas rates were found to be twice as high as those among the suburban children in the vicinity of Cincinnati, Ohio (6). While the Texas rates appeared

to be about half as great as rates observed in Kansas City, Mo., (6) they were still surprisingly high for a rural area. These rates were not accounted for by the presence of large numbers of Mexican or Latin American children, since less than 5 percent of the children tested were of such origin. The presence of Negroes did not complicate the picture, since they were not included in the analysis.

Table 4. Histoplasmin sensitivity prevalence according to sex among lifetime resident school children of Bell and Coryell Counties, Tex.

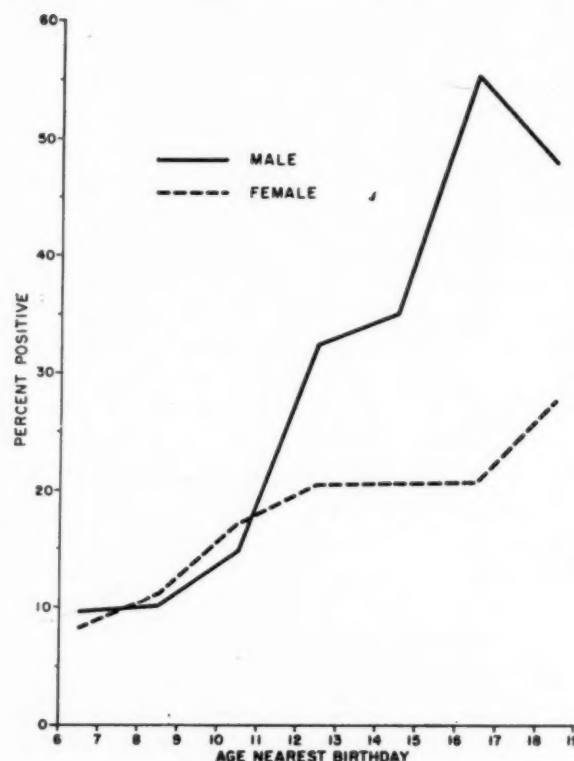
Age nearest birthday	Male			Female		
	Number tested	Number positive	Percent positive	Number tested	Number positive	Percent positive
6-7	73	7	9.6	73	6	8.2
8-9	138	14	10.1	134	15	11.2
10-11	149	22	14.8	128	22	17.2
12-13	118	38	32.2	122	25	20.5
14-15	103	36	35.0	102	21	20.6
16-17	76	42	55.3	92	19	20.7
18-19	46	22	47.8	29	8	27.6
Total	703	181	25.8	680	116	17.1

The histoplasmin sensitivity rates also deserve comment. While the exact prevalence of histoplasmosis in Texas has never been determined, a number of cases have been reported from Veterans Administration hospitals, Army hospitals, and other sources.

Preliminary studies mentioned earlier (1-4) had not indicated such a high prevalence of sensitivity among lifetime residents. The fact that 40 percent of the children were sensitive at the age of 18 certainly points up the problem for physicians in this area. It might also be appropriate to mention that *Histoplasma capsulatum* was isolated from 1 of 30 soil samples taken from the Fort Hood reservation. Also, this fungus has been isolated from the soil obtained from northeastern Texas near the Arkansas-Louisiana border.

Cross reactions between fungus antigens appear to be common. This is illustrated by the results of Smith and associates (8) showing cross reactions in humans between coccidioidin and histoplasmin. Also, cross reactions be-

Figure 4. Prevalence of histoplasmin sensitivity by sex among lifetime resident school children of Bell and Coryell Counties, Tex.



tween histoplasmin and blastomycin in humans have been reported (6). There is some evidence of cross reactions between histoplasmin and coccidioidin in these studies as evidenced by the finding that 45 persons reacted to both tests whereas, on a chance basis, only 13 reactions would have been expected. There was also evidence of specific sensitivity to both antigens.

Summary

Histoplasmin, tuberculin, and coccidioidin skin tests were made on 2,838 persons in Bell and Coryell Counties, Tex. Tuberculin sensitivity was found to be relatively high for a rural area. Histoplasmin sensitivity among lifetime resident school children was found to increase with age, reaching 40 percent positive in the 18- to 19-year age group, indicating a prevalence of sensitivity somewhat higher than had been expected for this area. The coccidioidin prevalence was low, which seems to

Table 5. Comparison of the size (in millimeters) of the histoplasmin and coccidioidin reactions in the same child (induration only)

	Histoplasmin						Total
	0	1-4	5-9	10-14	15-19	20 and over	
Coccidioidin							
Size							
0	2, 135	32	326	181	14	3	2, 691
1-4	38	4	15	4	3	0	64
5-9	10	1	10	12	5	0	38
10-14	2	0	4	5	0	1	12
15-19	1	1	0	1	1	0	4
20 and over	1	0	5	1	0	0	7
Total	2, 187	38	360	204	23	4	2, 816

indicate that *Coccidioides immitis* is not endemic to this area.

It would appear from the known geographic distribution of histoplasmin sensitivity that the rates of reaction probably are even higher as one moves eastward from this area. Physicians in the entire area should therefore be alerted for possible cases of histoplasmosis. As mentioned above, the cases of histoplasmosis which have been reported from Texas have been confined to the large medical centers and Veterans Administration hospitals. Since the infection is generally more common in rural areas, it is probable that large numbers of cases are being missed.

The low rate of coccidioidin sensitivity in Bell and Coryell Counties is noteworthy since the endemic area of coccidioidomycosis has not been too well defined in Texas. It is well known that western Texas and the Rio Grande River Valley are in the endemic area since cases have been reported in these locations (9). However, the extension of this area to the north and east has not been well delineated. From these studies it appears that this infection is not common in the central area of Texas around Fort Hood. The reasons for the occurrence of almost 2 percent coccidioidin reactors among lifetime residents are not evi-

dent. It might be due to the presence of only a few spores in the soil or to unknown visits into the high area of sensitivity. It should be remembered also that the prevailing winds blow from western and southern Texas over this area and might conceivably disseminate the spores of *C. immitis*.

ACKNOWLEDGMENTS

The authors are indebted to Florence B. Seibert of the Henry Phipps Institute of Philadelphia, Pa., for the purified protein derivative (PPD-S) tuberculin and to Charles E. Smith of the University of California for the coccidioidin.

REFERENCES

- (1) Loosli, C. G., Beadenkopf, W. G., Rice, F. A., and Savage, L. J.: Epidemiological aspects of histoplasmin, tuberculin, and coccidioidin sensitivity. *Am. J. Hyg.* 53: 33-57 (1951).
- (2) Palmer, C. E.: Geographic differences in sensitivity to histoplasmin among student nurses. *Pub. Health Rep.* 61: 475-487 (1946).
- (3) Christie, A., and Peterson, J. C.: Histoplasmin sensitivity. *Am. J. Pediat.* 29: 417-432 (1946).
- (4) Forbes, G. B., and Chang, C. C.: Histoplasmin and tuberculin sensitivity in Texas infants and children. *Pub. Health Rep.* 68: 320-322 (1953).
- (5) Shaw, L. W., Howell, A., and Weiss, E. S.: Biological assay of lots of histoplasmin and the

- selection of a new working lot. Pub. Health Rep. 65: 583-604 (1950).
- (6) Furcolow, M. L., Schwarz, J., Hewell, B. A., and Grayston, J. T.: Incidence of tuberculin, histoplasmin, and blastomycin reactors among a group of school children. Am. J. Pub. Health 43: 1523-1531 (1953).
- (7) Prior, J. A., and Allen, M. F.: Geographic distribution of histoplasmin and tuberculin reactors among Ohio State University freshmen and student nurses training in Columbus, Ohio, hospitals. Pub. Health Rep. 62: 1608-1617 (1947).
- (8) Smith, C. E., Saito, M. T., and Beard, R. R.: Histoplasmin sensitivity and coccidioidal infection. I. Occurrence of cross reaction. Am. J. Pub. Health 39: 722-736 (1949).
- (9) Smith, C. E.: Diagnosis of pulmonary coccidioidal infection. California Med. 75: 385-394 (1951).

for your P H I

P H I means PUBLIC HEALTH INFORMATION . . .

. . . to keep current you will want to read the significant papers to be published soon in P H R, which is synonymous with all-year coverage of public health activity. Use the subscription blank on inside back cover to arrange for *your* P P C, which is our term for and your assurance of a PERSONAL PAID COPY.

scheduled for early publication

Health Center Experience in North Carolina
 Radiation Injuries of Hiroshima Survivors
 The Medical Librarian
 A Rural Sanitation Program
 Conference Report on APHA Annual Meeting
 Research Progress Report on Arteriosclerosis

A cultural anthropologist suggests that examination of technological development programs of the past 20 years reveals certain empirically derived principles which have stood the test of time and which, if followed in setting the limits of community development programs, will greatly increase the chances of success.

Guidelines to

Community Development Programs

By GEORGE M. FOSTER, Ph.D.

DURING the spring term of 1954, I participated in an informal discussion group in the University of California's School of Public Health at Berkeley.

This group, which met for six 2-hour sessions over a period of 12 weeks, was composed of faculty members and foreign and native North American graduate students, most of whom had had field experience in areas other than the United States. The foreign students—there

were four—were members of international public health organizations active in Brazil, Ceylon, and Iran. The United States participants based their remarks on their various work experiences in China, India, Southeast Asia, Mexico, El Salvador, Puerto Rico, Peru, and Chile.

The general topic of the meetings, which was never formally stated, had to do with the manner in which cultural factors bear upon the success or failure of community development programs. Though the group was primarily interested in questions of public health, it soon became apparent that public health could not be treated as an isolated problem and that the community itself must constitute the real focal point of interest.

There emerged from the deliberations of the group the conviction that, although precise rules for successful work in any geographic area, or any limited disciplinary field, could not be laid down, there were, nevertheless, certain general principles which seemed to hold good in most situations. These cannot be thought of as "principles" in the scientific sense of the word, but rather in the sense of empirically derived rules which, if borne in mind by field personnel, would contribute to the success of their programs. These rules, which constitute the greater part of this report, are in no sense new or original. They represent, rather, a summary of field experience of the discussion group, sup-

Dr. Foster, the former director of the Smithsonian Institution's Institute of Social Anthropology, is visiting professor of anthropology and lecturer in public health at the University of California (Berkeley). Also a member of the Health Committee on Foreign Operations Administration programs, he became active in the field of public health after making a preliminary analysis of the bilateral health programs in Latin America for the Institute of Inter-American Affairs and joining the IIAA evaluation team headed by Dr. Wilton L. Halverson. Some contemporary Latin American cultural problems and their relationship to the planning of public health programs have been summarized in the report of Dr. Foster's section of the IIAA survey as "Use of Anthropological Methods and Data in Planning and Operation." This report was published in Public Health Reports, September 1953, p. 841, as one of the Servicio evaluation series.

Members of the Discussion Group

Foreign students:

- Nilo de Brito-Bastos, M.D., Servicio Especial de Saúde Pública, Brazil.
Siri Dangalle, Unesco-Ceylon Fundamental Education Project, Ceylon.
Hortensia de Hollanda, Ministry of Public Health, Brazil.
Garegin Saroukhanian, Public Health Cooperative, Foreign Operations Administration, Iran.

University of California faculty members:

- Jessie M. Bierman, M.D., professor of maternal and child health.
George M. Foster, visiting professor of anthropology and lecturer in public health.
William Griffiths, associate professor of public health.
Jerome Grossman, associate in public health.
Ann Haynes, visiting professor of public health education and chief, bureau of health education, California State Department of Public Health.
Ruth Huenemann, lecturer in public health nutrition.
Sarah Mazelis, associate in public health.
Edward S. Rogers, M.D., professor of public health and medical administration.

United States students:

- Ernest Bertellotti, Dorothy Craig, John Hayakawa, Ellen James, Virginia Pence, and Edward Riggs, M.D.

plemented by the conclusions contained in a series of papers and books which have appeared over the past 15 years. They may be thought of as a "practical," "rule-of-thumb," or "working-man's" guide rather than as a theoretical statement of the principles of culture change.

Since general theoretical principles are not dealt with at length here, it is desirable to state more precisely the limits of the problem as considered by the group. Early in the discussion it was agreed that the concept of culture constituted the key to the problem. Simple definitions of culture were accepted: the common way of life shared by the members of a group, consisting of the totality of tools, techniques, social institutions, behavior patterns, attitudes, beliefs, motivations, systems of values, and the like—or, to use Linton's short definition (1): behavior and the products of behavior of a human group.

Two basic aspects of culture were found to bear directly on the problem.

First, it was agreed that any culture should be thought of as a functional, integrated whole, and not as a haphazard collection of customs and habits. If the analogy is not carried too far, a culture could be compared, it was felt, to a biological organism, in that each of its parts is related in some way to all other parts. Each part fulfills a definite function in relationship to the other parts and contributes to the normal functioning of the culture as a whole. Each part, in turn, draws upon all the other parts in some way for its own continued existence, and its growth and development are dependent on corresponding growth and development in the culture as a whole.

To illustrate this concept of integration in terms of public health, it was pointed out that preventive medicine and sanitation projects are not isolated parts of the life of a people. They are related to education, economic productivity, distribution of income, social security, municipal administration, philosophical and religious premises, and a host of other things. Changes in the level of health in any given region may result from improvements or changes in these aspects of culture. Conversely, changes that can be brought about by planned action are limited by, and dependent on, the changes that simultaneously are occurring, or can be made to occur, in these related aspects.

Second, the group recognized that all cultures are capable of change and that all cultures are constantly changing, whether the pace be rapid or slow. It was agreed that there are definite, though unfortunately imperfectly understood, rules of human behavior which govern the processes whereby changes occur. In general, there appear to be two basic types of culture change: One may be called "spontaneous," or perhaps "evolutionary," in that the change happens without the conscious efforts of individuals or groups, and the other may be called "directed," or "guided," in that group planning and action leads to goals which, it is thought, will promote a happier, healthier, better educated, and independent society. All community development work, regardless of type, clearly falls in this second category.

Obviously, directed culture change is, in the broad sense, not new. Wars of conquest, economic development of societies and geographic regions, missionary activities, democratic community organization for civic ends, the efforts of the fathers of the American Revolution, all fall into this category. But, in recent years, certain types of guided culture change have swung into sharper focus. Though the term is now officially obsolete, "Point IV type programs" conveys the idea in fewest words. Regardless of sponsorship, the thought is that through a combination of outside and self help the economic and emotional security of those people of the lower social and income strata, wherever they may live, may be advanced. The problems often are more acute in those countries of slight economic development, as contrasted with the more highly industrialized areas, but the question seems to be one of degree and not of kind. One of the most interesting facts to develop from the discussion group was that the problems—and the means of attacking them—that applied to foreign countries were believed by those who had worked principally in the United States to reflect local situations to a surprising extent. That is, the rules for successful work in, let us say, Latin America, are also good rules to apply in the United States.

A particularly difficult question underlying directed culture change programs is that of "values." Who determines the needs and rights of a people? Who decides what is best, what should be done, what habits should be changed? In general, it was agreed that all such goals should be a function of the culture in question and not a reflection of the goals and attitudes of the outside countries sending the specialists. Though the discussion group considered the matter of values, for purposes of outlining rules of work, the question was begged. It was assumed that through research and careful thought, and through consultation and planning among all interested governments, goals could be determined which are consistent with the felt needs and aspirations of the people to be affected.

The problem then became one of determining the most practical methods to be used in field

operations. There was general agreement that the 12 rules listed and discussed below, although not constituting an exhaustive list, seem to hold true in a majority of cases.

The 12 points suggested do not constitute a guide to any specific type of program—health, agriculture, or education. The list does not include all the things that the program planner and director should bear in mind, nor do all of the points necessarily apply in a given situation. Any specific problem must be thought of as a more or less unique phenomenon, although it will, of course, have much in common with other similar problems. Many of the general principles suggested here will apply, but they are no substitute in themselves for thorough and accurate community analysis before a program is completely planned and initiated.

1. Know the culture in which work is to be done

Since the idea behind directed culture change is to change or add to something already in existence, it is apparent that we must know what the "something" is before an attempt to change it is considered. There are, unfortunately, no short cuts to learning a culture. It is work that takes time and patience. And, in most cases, it is best done by a trained cultural anthropologist or sociologist who is familiar with the projected action goals and who bears in mind the data needs of the administrator but who, nevertheless, ideally works toward a full picture of the culture. This is a point that is sometimes hard for the administrator to understand. The reason is that in the beginning it is often impossible to know what significant factors bear on any concrete project. An obscure point in the prestige complex of a people may, for example, hold the key to the successful introduction of pit privies; or the supernatural beliefs of a people with regard to seed corn may be the determining factor in preventing the introduction of a hybrid variety.

Although at the present time there is great need for thorough basic studies in all cultures, the problem of acquiring the necessary insight will become easier as time passes and knowledge is accumulated. Although each country, and

each village, is different in some ways from all others, nevertheless, all villages in an area and most countries in a region share a majority of their basic culture patterns. This means that when a series of selected studies has been completed it becomes possible to infer a great deal about the basic patterns in other unstudied areas; that is, the basic underlying patterns hold true over wide areas. Once these patterns are worked out, the research problem then becomes one, in any specific locality, of isolating the specific factors that are unique to the locality, and relating these factors, as well as the underlying patterns, to the immediate project.

For example, cultural anthropologists and rural sociologists have, over the past 25 years, made a series of basic studies of contemporary Latin American culture. Although the picture is far from complete, enough of the basic patterns have been isolated so that when a specific project was outlined it was possible to acquire significant data in a surprisingly short time because the field workers built on the accumulated scientific capital of 25 years of work. Hence, if we are correct in assuming that directed culture change programs are just beginning a period of enormous expansion, it is particularly important to urge that active support be given to long-range basic cultural analyses.

2. Select the site of operations with extreme care

Paradoxical as it may sound, at this stage of our knowledge it is usually wise to select a community which, through past progress and a progressive spirit, gives indications of future progress. All too often, program sites have been selected on the basis of the absolute poverty of a people, of their crying need for help. To select communities that are somewhat better off, it is argued, would reflect a fundamental disregard for humanitarian principles. Communities in all parts of the world tend to fall into progressive and conservative categories. The factors that underlie these differences are not well understood, but it does not take extensive investigation to determine, in any locality, the order of rating of all groups. Usually, the people of a community know where they themselves fall. Factors which may often underlie a progressive community, and which

therefore make it a favorable one in which to commence work, include a relative lack of social cleavages, a reasonably stable economic basis, the characteristics of a population that is not too marked by transients or one in which political dissensions are not extreme, and so forth.

So little is known about the requirements for successful directed culture change that failure may result, even under apparently ideal circumstances. Too many otherwise sound projects have been doomed to failure before they were begun simply because the most difficult site possible was selected. Once a certain success has been obtained in a community, once the confidence of field personnel to cope with the local situation is established, once the specific problems of operation of a given locality are solved, then it is possible to work in the socially and economically more retarded communities. Often the successful example of a progressive village will spell the difference between success and failure in adjacent neighborhoods.

3. Pay first attention to selection of the program staff

The delegating of authority to individuals temperamentally and scientifically unsuited to the work they are to perform has caused as many failures, perhaps, as any other single factor. It is better not to start a program than to attempt to push it through with unsuitable personnel. Perhaps failure to pay adequate salaries is the biggest single shortcoming in selection of personnel. Reasonably high pay is essential for at least two reasons: to attract persons of sufficient education and intelligence to understand thoroughly the problems involved; and to give personnel sufficient prestige and status within their own bureaucratic organization so that they identify themselves with the goals of top level management, rather than letting them feel that they are underpaid and unesteemed flunkies. Personnel must command the respect equally of their superiors and of the people among whom they work.

4. Regardless of long-range hopes, start with a simple project that shows obvious results in a short time

It is difficult, if not impossible, to maintain unflagging enthusiasm on the part of local peo-

ple if results are not quickly apparent to them. The local leaders who identify themselves with a new program, and who push it among their fellows, threaten their own position in the community when they cannot demonstrate results within a reasonable time. Frequently, the best local cooperators have been lost, and perhaps their active opposition has been incurred, simply because results could not be shown or perhaps because outside promised aid, on which they counted, was slow in making its appearance.

It is quite legitimate to use "bait" projects if necessary—projects not directly associated with long-range goals, but which represent felt needs of the people and which arouse their interest. Whatever the initial projects, avoid those heavily charged with emotional factors. Since the emotional charge varies enormously from culture to culture, it is apparent that sound basic knowledge of the local group is essential to avoid possible mistakes here.

5. *Take advantage of the pragmatic nature of people*

This rule is closely related to the preceding one. The most striking fact to emerge in recent studies of directed culture change is that people are pragmatic to an unexpected extent. If with their own eyes they can see results that they recognize as beneficial to them, regardless of their understanding of the reason, regardless of tradition and superstition, regardless of factors that might otherwise cause them to hold back, most people will give up the old and adopt the new. The problem, of course, is the means of convincing people that something is beneficial to them.

In general, a striking demonstration of the new is a positive way of changing behavior. In some areas this is easy. Malaria and yaws control programs, for example, quickly convince. Smallpox control is more difficult to prove, since success is less spectacular. However, if a striking demonstration can be made in any area of culture, the confidences established in the innovators may often be utilized to effect changes in areas where demonstration is difficult, if not impossible. Or, in other words, proof in one area will lead people to take other statements on faith—faith that would not

be forthcoming without the original demonstration.

In one South American city, for example, the visual success of an emergency whooping cough inoculation program in stemming a threatened epidemic was sufficient to assure the active cooperation of mothers in a subsequent BCG tuberculosis campaign.

But simple, unspectacular demonstrations are also important in many projects. To illustrate: If it is desired to introduce a new food, it is essential to show by demonstration all the steps in its preparation. Food and its preparation diffuse as a unit. It is not sufficient to give people the new food and expect them to cook it according to one of their traditional ways.

6. *Don't ask people to do anything they fear may threaten their already narrow margin of material security*

The poorest farmer is not the one who will first try an improved seed, no matter how desperate his need. However precarious his situation, from past experience he at least knows the dangers and limitations inherent in his traditional methods; he knows what to expect and can lay his plans accordingly. He is not apt to risk this narrow, but predictable, margin of known security by taking a chance on the say-so of an outside stranger. The poorest and busiest mother with the most sickly children is not the one who can afford to stand in line long hours in a health clinic to have a child examined. In general, most progress will be made if a target group is selected that lies somewhere between the lowest and highest extremes of social and economic status. Once progress is demonstrated with this target group, the obvious benefits will diffuse both upward and downward.

7. *Think in terms of the economic and social potential of the community—not in terms of an ideal program*

In the long run, any new program will have to be carried in large measure by the people themselves. Overplanning, in the sense of the "best" program for, let us say, a small rural center, may burden its citizenry with economic and maintenance commitments which would only be consistent with the growth of a prosperous industrial community.

8. *Aim at integrated, broad programs*

Insofar as is possible, it is usually advisable to think in terms of total community development rather than in terms of a single field of endeavor. In the first place, broadening a program spreads capital investment more widely, thus lowering unit costs. In the second place—and even more important—no type of project operates in a vacuum. A sound health program, as pointed out, depends on good agriculture, education, honest and efficient civic government, and an economic surplus. Good farming depends on healthy and informed workers, and good government requires all of these underlying factors, and many more. There are, admittedly, many practical problems that interpose themselves between the desire for a broad program and its realization; and special local situations will sometimes mean that it is impossible or unnecessary to conduct a program on a broad basis. Nevertheless, as a general goal, this aim seems valid.

9. *Follow the right sequence in a program*

All community programs represent continuums in time. Each project of a major program must be adapted both to the other projects and to the general cultural setting, not only as of a given date, but also in terms of time depth. When the factors that bear on the relationship of a given project to other projects, and to the culture at large, are known, then its place in the sequence of projects can be better determined. For example, reading rooms and books should not be introduced into a community until such time as the ability to read has become an accepted value by at least a significant part of the group and until this part is clamoring for knowledge. Or again, undue stress on preventive medicine in public health programs will meet with little success until the immediate felt need of curative medicine is at least partially satisfied.

10. *Use existing community leadership whenever possible*

In general, the evidence indicates that existing community leaders working through existing community institutions, such as church, government, school associations of fathers or mothers, and the like, constitute the most effective

way to get action. Individuals who are poorly adjusted to their own cultures and whose discontent often quickly brings them to the side of outside innovators, will not, in most cases, be leaders who can aid a project. It is important to recognize the distinction between formal and informal patterns of leadership. Both patterns have their place in community development. Unfortunately, our knowledge of the structure of leadership in many parts of the world is rudimentary and much research on this problem seems indicated.

11. *Avoid local commitments against a project*

Every effort should be made to obtain the cooperation of as many people as possible before they go on record as opposing the project. There are almost always people in each community who are only too anxious to express themselves negatively, particularly if their advice has not been asked. Once committed publicly against a project, it is very difficult for them to change their stand, since it will mean a possible loss of "face." If positive cooperation cannot be elicited, at least try to promote a neutral attitude.

12. *Require payment for certain services*

A great deal of evidence suggests the wisdom of charging at least a token sum for many types of health, agricultural, and educational services. In many parts of the world, the fact that something is given away carries a strong implication of worthlessness. Even a small payment, adjusted to the ability of the recipient to pay, will often create an awareness of value and will elicit cooperation, where the same service or item given free would be ignored or thrown away. To illustrate: In an agricultural extension program in a South American country, it was found that if fruit trees were given to farmers, the farmers usually failed to plant them. When a small charge was made for the same trees, the farmers' interest was heightened, more trees were planted and cared for, and the overall results were more satisfactory.

REFERENCE

- (1) Linton, R.: The cultural background of personality. New York, N. Y., Appleton-Century-Crofts, Inc., 1945, p. 32.

Dining Car Sanitation in the United States

By WILLIAM H. MEGONNELL, M.S., and EDMUND C. GARTHE, C.E., M.P.H.

ONE of the most striking features about dining cars is that while they resemble restaurants they are, at the same time, very dissimilar. True, the dining car is simply a special kind of restaurant—a restaurant on wheels, not differing in other essentials from other establishments where food is prepared and served. Dining cars and restaurants purchase the same kinds of food and prepare and serve them in the same manner, employing the same kinds of people. However, the one essential difference—mobility—creates problems which are peculiar to dining cars. It is one thing to supply and operate a stationary restaurant and quite another to supply and operate a restaurant that traverses hundreds of miles of railroad track.

A dining car superintendent has to anticipate and cope with seasonal peak loads and plan for large special movements of passenger traffic, such as are associated with military or emergency activities. Add to this the possibility of breakdowns, accidents, and other contingencies, and it is apparent that a sizable pool of fully equipped cars and trained personnel must be kept in reserve for such circumstances. This

is tantamount, if it can be imagined, to a large restaurant chain's keeping idle several expensive restaurants which are opened for business only during occasional rush periods.

The relationship between travel and the spread of disease has been recognized for centuries. Many hundreds of thousands of people in the United States travel on trains every day. About 80 million meals are served in dining cars each year. Thus, the fundamental rules of food service sanitation for preventing the spread of disease apply equally to dining cars and restaurants.

Since dining cars are rolling restaurants which cross State boundaries, their sanitary control is clearly a Federal responsibility. Indeed, it would be almost impossible to control them otherwise. The multiplicity of State and local health requirements and the variations in inspections by different health departments would result in intolerable confusion to carrier companies. More important, attempts by a State or local health department to follow through on an inspection or to investigate a disease outbreak attributed to food or drink consumed on a diner would be so complicated, after the conveyance had traveled into another State, that the efforts largely would be futile. Even negotiations between a health department and a railroad company would be difficult and complicated if the carrier's headquarters were located in another State (1).

Interstate quarantine authority was given to the Public Health Service by an act of Congress approved February 15, 1893 (2). This action was taken because of the continued presence of yellow fever during the summer months in the southern States. It was believed that the interstate railroads were a big factor in

Mr. Megonnell, senior assistant sanitary engineer, Interstate Carrier Section, General Engineering Branch, Division of Sanitary Engineering Services, joined the Public Health Service in July 1951. Mr. Garthe is the regional engineer for Region III of the Service (Washington, D. C.). At the time he was chief of the former Interstate Carrier Branch, Mr. Garthe coauthored with Howard W. Chapman, the article "Sanitation Aboard American Flag Vessels," published in Public Health Reports, October 1952, p. 963.

transmitting the disease from one State to another.

The interstate quarantine regulations, promulgated under the 1893 act and effective September 27, 1894, were the first concerted attempt to deal with the interstate spread of disease. These regulations have been revised and amended from time to time, most recently in 1951, to take cognizance of new developments in health and technology (3, 4).

Development of Diners

In the earliest days of railroading, before the advent of the diner, passengers had to depend largely on their own ingenuity for sustenance during a journey. The hardier and more resolute individuals risked the "eat-and-run" meals available at station stops; the less hardy or more discriminating resorted to carrying "shoebox" lunches. Both resources had obvious disadvantages. The food available at many stations in those days was generally stale and unsavory, while cleanliness and sanitation were questionable, at best. Lack of refrigeration and the presence of dust, soot, and insects often destroyed the appetite—and sometimes the health—of those who carried their lunches. The remaining choice, which many passengers took, was to go hungry (5).

Eastern railroads improved the intolerable situation by better surveillance and supervision of existing establishments. In the west the problem was more basic than amelioration because there were few restaurants of any sort. However, in 1876, a young railroader with the firm conviction that the traveling public would appreciate and generously reward anyone who began the reformation of the lowly railroad eating house established the first of what were destined to become famous station restaurants (6). Some of these exist today. His high standards of cleanliness, excellent cuisine, efficiency, and service developed into an art which became the model for such establishments and doubtless influenced the quality of railroad dining service.

Technological progress of the railroads and demands of the speed-conscious public who objected to meal stops made inevitable some form of food service en route. The first recorded at-

tempt to provide food aboard trains was made in 1862 by the Camden and Amboy Route, which converted a baggage car into a diner for use on its Washington express. The following year, the Philadelphia, Wilmington & Baltimore Railroad remodeled two day coaches for service as diners between Philadelphia and Baltimore. In 1867, George M. Pullman introduced "hotel cars," which were sleeping cars equipped with kitchen and dining facilities. The first full dining car was built by Pullman in 1868 for the Chicago & Alton Railroad (5).

Regarded at first as somewhat of a curiosity, dining cars were enthusiastically received by the traveling public, but they did not come into general use until the late 1800's, no doubt as a result of the intense railroad competition during that period. Dinner in the diner became as much a part of the romance of railroading as the familiar click of the wheel on the track. As the shoebox lunch gradually disappeared the dining car became the real heartbeat of the train and the showcase of the railroads.

Although the Public Health Service was charged with the control of sanitation on dining cars, other important duties and budgetary and personnel limitations made an aggressive program impossible. So for many years governmental inspection and supervision of sanitation on dining cars were sporadic. All commissioned officers of the Service were under orders to inspect dining cars while en route on trains on official business; occasionally, surveys of entire roads or of all dining cars entering a railroad center were conducted as the result of a complaint; but there was no continued, routine program for such work.

However, from the beginning the railroads set high standards for their dining car service. Gleaming tableware, spotless linen, immaculate and courteous waiters, gracious stewards, and tasteful decor—all of these contributed to the dining car's unique atmosphere.

The War Emergency

During and immediately after World War II, uncontrollable emergency conditions precluded the exactitude formerly devoted to the comfort of the traveling public. Warworkers and servicemen were on the move, often with their fami-

lies, traveling from one section of the country to another on an unprecedented scale. The heavy increase in wartime rail travel came when railroads were unable to purchase new equipment. At the same time well-trained employees were off to war or to more lucrative jobs, forcing dining service managers to employ large numbers of untrained personnel.

This Nation could ill afford to waste manpower sick abed—or buried—as a result of foodborne or other disease. The increased significance of the Public Health Service's responsibility to prevent the interstate spread of disease during the war emergency led to a major intensification of its railroad sanitation program. A large portion of the country at war was eating from the dining car's "hands," and these "hands" had to be kept clean.

As one of the first steps in discharging its increased responsibility, the Public Health Service in 1942 prepared the "Sanitation Manual for Land and Air Conveyances Operating in Interstate Traffic" (7) to provide public health and railroad workers with necessary information upon which to base their activities under the interstate quarantine regulations.

Mobile bacteriological laboratories of the Service toured the country. As part of their duties the laboratory staffs examined milk and water supplies used aboard dining cars and made swab tests of eating and drinking utensils to ascertain the adequacy of dishwashing and sanitizing methods aboard conveyances. Also, during this period, studies of the sanitation problems peculiar to dining car operation were being conducted by the Service.

After the war the railroads desired to reestablish, and even to improve, the traditional, pre-war, high-quality standards of their dining service. To aid them in their efforts, and to enhance its activities in the prevention of disease borne by food, milk, and water, the Service further expanded and intensified its dining car sanitation program. Additional personnel were employed and trained as inspectors, and liaison with railroad associations, individual companies, and designers and builders of dining cars was strengthened.

As a starting point in their program many railroads began planning the construction of new cars, and others undertook reconstruction



Courtesy Pullman-Standard Car Manufacturing Co.

One of the first Pullman "hotel" cars—1867.

of old ones which had been so overworked during the war. It had long been recognized that the plant where a conveyance is built or rebuilt is one of the best health control points. Placing greater emphasis on construction, Service personnel began to furnish consultative and inspectional services to designers and builders of railroad passenger cars.

One large company, in 1944, requested advice in designing new equipment and rehabilitating old cars. Thus was born the Service's plan-review program, under which plans for construction or major repair of conveyances are examined and are either approved or returned to the carriers with recommendations for changes. Under provisions of the interstate quarantine regulations, carriers are required to submit such plans or to arrange for Public Health Service inspection during construction.

In 1951, with the cooperation of the Joint Committee on Railway Sanitation of the Association of American Railroads and railroad car-building firms, the Public Health Service published the "Handbook on Sanitation of Railroad Passenger Car Construction" (8), which contains guides for incorporating sanitary provisions into the design or construction of railroad passenger cars and the reconstruction of existing cars.

Nowadays, before accepting delivery of a conveyance, a carrier usually specifies that the builder must obtain a Certificate of Sanitary

Construction from the Public Health Service. This certification, which shows that dining cars have been constructed or reconstructed in compliance with the interstate quarantine regulations, is mutually advantageous to the carrier and the builder. The builder is protected from future criticism; the purchaser is assured that his conveyance has been constructed in accordance with high standards which reflect decades of sanitary engineering knowledge. Of 230 new and rebuilt railway conveyances completed in 1951, 1952, and 1953, Certificates of Sanitary Construction were awarded for 144, or 63 percent.

Construction of Dining Cars

The typical modern dining car is about 85 feet long, seating 36 to 48 persons. Articulated twin units consist of 1 car, which seats from 64 to 68 persons, and an adjoining car, which contains the kitchen and either dormitory facilities, on an overnight run, or a lunch counter, if used in day service. Triple units have dining space in the cars at either end, with kitchen and dormitory facilities in the center car.

A multitude of limited facility cars are used either in combination with, or in lieu of, dining cars. These include coffeeshop, grill, lunch, cafe, buffet, counter, club, tap, bar, tavern, and lounge cars. Designs are usually as varied as the names, but they are not so different as their designations would suggest.

"Dining car," in Public Health Service sanitation terminology, means any railroad passenger conveyance on which food or drink is regularly prepared, stored, or served (9). Lounge and bar cars, snack cars, the recently introduced vending machine cars—and even the news butcher who peddles food and drink through coaches—all come under surveillance by Service inspectors.

Probably the most obvious condition one notes on his first entry into a dining car kitchen is that space is extremely restricted. Since the kitchen and pantry are, usually, only about 30 feet long, practically every inch of available space is utilized in their construction. Operations must be conducted efficiently, and the old maxim, "a place for everything and everything in its place," must be observed punctiliously.

Perishables must be refrigerated, utensils must be washed and treated bactericidally, and all of the other facilities required for full-scale restaurant operations must be crowded into a little more than one-third of the area of a railroad passenger car. Consider, in addition, the proximity and heat of the ranges and the lurching and swaying of the train as it travels at high speed, and you may well be amazed that meals of such quality, and in such quantity, can be prepared and served.

The "conventional" dining car is equipped with a coal range, charcoal broiler, steam table, steam coffee urn, manual dishwashing facilities, and ice refrigerators. Special studies, liberally garnished with trial-and-error experiments, demonstrated that certain structural changes would result in better cleanability and sanitation in dining car kitchens, and would at the same time improve the comfort, convenience, safety, and operating efficiency of crew members. Thus, in the "improved conventional" diner, the modifications made, usually, have been in the fuel used for cooking and the refrigeration method. Also, mechanical dishwashing and more electrical equipment are often added.

Many roads turned to pressed sawdust logs, instead of coal, for cooking fuel, because the pressed logs were more easily stored and their use resulted in a somewhat cooler and cleaner kitchen and eliminated the noxious coal gases. Other lines converted their ranges to burn oil, or butane or propane gas (10). These fuel improvements gave the employees a much cleaner and cooler kitchen and also faster and more uniform heat. There was, moreover, a saving of precious space, which is at a premium in any dining car kitchen. Certain roads by installing electric ranges further improved these factors.

Refrigeration came in for its share of modification. For many years railroads had used ice exclusively. But ice had some serious disadvantages as a refrigerant for dining car purposes. Its bulky form took up much valuable refrigerator space. More important, from the public health viewpoint, the uneven, relatively high, and uncontrollable temperatures often resulted in deterioration of foodstuffs and made possible the growth of any pathogenic bacteria which might have been present.



Courtesy Baltimore and Ohio Railroad, Inc.

Dinner in the modern diner.

Some railroads have found that dry ice (carbon dioxide) refrigeration overcomes the shortcomings of ice made from water (11). Since dry ice is more compact, it conserves space needed for the storage of perishable foods. Dry ice refrigeration units may be equipped with thermostatic controls which permit, to some extent, the stocking of frozen foods. Moreover, dry ice lasts six times as long as water ice. Icing is done inside the car, thus eliminating the need for overhead ice bunkers through which dust often entered.

Several carriers have installed mechanical refrigeration. Elimination of ice storage compartments of any kind increases refrigerator capacities by as much as 30 to 40 percent. The low temperatures which can be achieved and

their high degree of uniformity enable the wide use of frozen food products.

Blueprints for an "all electric" diner were drawn in 1936, but the first such car was not actually built until 1949 (12). Two-story dining cars are now under construction. Even three-level diners are within the realm of speculation. As railroads seek new methods of improving their dining service, the future appears to point to the electronic diner which is, in fact, already in limited use (13). The most important use of electronics will be, probably, in the realm of microwave cooking, or what may be more accurately described as "food conditioning." Experimentation with this method (14), conducted by railroads in the past few years, has demonstrated that the system has

several important advantages over current methods. It will solve many of the existing sanitation problems, but it will, undoubtedly, intensify or create others.

Although dust control is a problem, to a certain degree, in practically any food establishment, the problem is much greater on dining cars. Special precautions must be taken since roadbed dust which might carry pathogenic bacteria is easily sucked into these mobile restaurants as the trains speed along. Caps must be provided over floor and refrigerator drains, or water-sealed traps must be built into drainlines, to prevent the infiltration of dust. Windows and doors must be sealed or tightfitting. The practice of opening the kitchen loading door to increase air circulation long ago was recognized by the Service as a potential hazard.

Adequate ventilation of dining car kitchens has long been of concern to railroad officials, operating crews, passenger car builders, and the Public Health Service. Early attempts to reduce radiant heat, improve ventilation, and enhance crew comfort included the application of grills with filters to the side doors and the increased use of exhaust fans. Smoke pipes, oven doors, and the fronts of combustion chambers were insulated, and movable insulated shields were installed in front of the stoves for the protection of the cooks.

Each of these measures improved conditions to some degree, but dining car kitchens continued to be far from ideal work areas. Until recently, despite the modernization of passenger accommodations beginning around 1930, little attention had been given to the air conditioning and ventilation of kitchens and pantries. The design engineer was confronted with many developmental problems, and it was not until 1946 that the first forced-air ventilation system for a dining car kitchen was built. Numerous improvements have been made since then, but other problems remain to be solved.

At least one railroad (and there are indications that others might follow) has adopted a new type of diner with open kitchen and pantry, permitting its crew to prepare short-order meals in the air-conditioned atmosphere enjoyed by passengers. An added advantage is that, since the crew works in their constant view, the passengers become their own public health in-

spectors. This tends to influence the crew to maintain a high degree of cleanliness.

Other notable improvements in the sanitary construction of dining cars in recent years include:

- Increased use of noncorrodible, nonporous, and easily cleanable materials, such as stainless steel.

- Rounding of joints, filling and finishing of construction seams, and enclosing of inaccessible spaces, to promote cleanliness and to eliminate harborage for vermin.

- Installation of adequate and convenient hand-washing facilities.

- Provision of proper facilities for washing and bactericidal treatment of utensils, whether done by manual or mechanical means.

- Improved methods of storing or disposing of garbage.

- Increased lighting on working surfaces and in lockers and refrigerators.

- Provision of suitable facilities for the storage and washing of ice for use in beverage glasses.

- Installation of wells with hot or running water for storage of frozen dessert dispensers.

- Construction of shelves, can openers, tray and knife racks, and other equipment so they can be easily removed and cleaned.

Also, increased use of dormitory cars with sleeping, ablutionary, toilet, and clothing storage facilities has encouraged personal hygiene of crew members and contributed materially to sanitation of dining cars. Some railroads bought new equipment for this purpose. Others converted old coaches, lounge cars, or other equipment into employees' quarters.

Public Health Service Inspections

The Association of American Railroad Dining Car Officers and the Association of American Railroads' Joint Committee on Railway Sanitation assisted in the preparation of a manual, the "Handbook on Sanitation of Dining Cars in Operation" (9), published in 1952, which was designed to assist those who must apply the principles of food sanitation in routine dining car operation and maintenance.

The official dining car inspection report is based on the sanitation standards given in the

published handbooks. Weights have been assigned the various items of sanitation on the form so that dining cars can be rated numerically. This affords a means of comparison, both among cars of one railroad and among the diners of different carriers. It is, also, a means of measuring and evaluating advancement in the dining car sanitation program.

More than 2,000 dining car inspections are conducted annually. Continuous improvement in sanitation of dining cars in operation is indicated by the gradual rise of the national average sanitation rating of all conveyances inspected. The average rating rose from 86.7 in 1951 to 89.0 in 1953. A Certificate of Sanitation is awarded to a carrier for each dining car which rates 95 or higher on inspection. The certificate is posted aboard the conveyance where it can be easily seen by passengers and employees, thereby stimulating interest in sanitation and promoting competition among crews. Certificates of Sanitation were issued for only 17.3 percent of the dining car inspections in 1951. The percentage increased to 24.1 in 1953. Also, in that year, the Service awarded a special citation to the first major railroad whose dining cars had all rated Certificates of Sanitation (15, 16).

The "good ol' days" custom of obtaining meals at station stops has been continued on certain runs; it is being revived or initiated on others. Sanitation of these establishments comes under local control since they cater also to the non-traveling public.

Supplying dining cars, particularly with perishables, is a serious consideration. Commissaries with adequate storage and handling facilities and competent personnel must be established along the line to restock the cars on long runs. Since these establishments, of which there are about 200, do not serve the local public, they are usually inspected only by the Service.

The use on trains of vending machines which dispense sandwiches, ice cream, cake, crackers, doughnuts, fruit, candy, coffee, milk, juices, and soft drinks has increased in the past few years. There are indications that this trend may continue. The machines, usually installed in a coach, may supplement or supplant dining car service. Preparation, storage, and handling of

foods at supply sources, replenishment of stocks aboard cars, and cleaning and servicing of machines—all are scrutinized by Service inspectors. In addition, close liaison is maintained with equipment designers and fabricators to assure, for example, that refrigeration is adequate, that the machines are easily cleanable, that food contact surfaces are of nontoxic materials, and that vermin harborages are not afforded within the units.

Much has been done to ascertain and inspect sources of prepared sandwiches sold by the



Courtesy ACF Industries, Inc.

Kitchen and pantry of a modern dining car.

news butcher. In the past, disease outbreaks which have been attributed to such foods were traced to questionable sources of supply. Personal hygiene of employees has not always been up to desirable standards. Refrigeration has often been inadequate, and storage and disposal of garbage and other refuse have frequently been unsatisfactory. To overcome these hazards, many railroads do their own vending from the dining cars, by sending crew members through the train with food and drink. In any case, concessionaires are held to the same rigid standards of food sanitation as the dining car department, and they are subject to the same strict and frequent inspections.

To assure compliance with those provisions of the interstate quarantine regulations pertaining to the serving of wholesome foods, the safety of water, the purchase of shellfish from approved dealers, and the pasteurization of milk and frozen desserts, the dining car sanitation program extends beyond the railroad's facilities to the very sources of supply. Long-established arrangements have been continued with State health departments for routine supervision of suppliers. Each year about 3,000 inspections are made of sources of water, milk, and frozen desserts.

To keep carriers informed of the status of each supplier, the Service publishes the "Official Classification of Railroad Watering Points" and the "Official Classification of Milk and Frozen Dessert Sources." These are semi-annual listings of sources of supply which have been inspected and classified as approved, provisionally approved, or prohibited for the use of interstate carriers. Provisionally approved sources must effect the necessary corrective action without delay or they risk being classified as prohibited sources. Lists of shellfish dealers who hold unexpired and unrevoked certificates issued by State authorities also are published regularly by the Service.

Disease Outbreaks

If a disease outbreak occurs on a train, or is suspected of resulting from food or drink consumed or environmental conditions encountered on a conveyance, the Public Health Service and State and local health departments have technicians who cooperate in epidemiological surveys to determine the cause of the outbreak and to prevent recurrence. Fortunately—no doubt as a result of the far-reaching preventive measures—railroads find it necessary to avail themselves of this service very infrequently.

Data on disease outbreaks resulting from food or drink consumed on dining cars are indeed meager. This is easily understandable. It is well known to public health workers that complete and accurate reporting of all disease outbreaks is virtually impossible. This is particularly true of most food-poisoning illnesses which, though often violent, are of comparatively short duration. Many victims do not seek

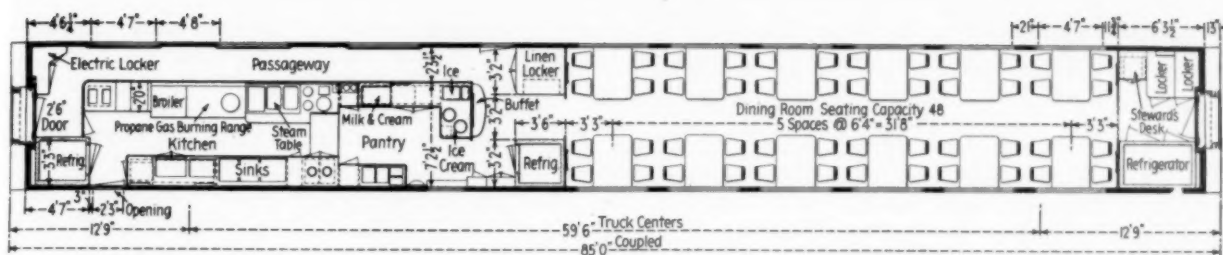
medical assistance, and recovery is usually rapid and complete. Because railroad passengers scatter to various parts of the country upon completion of their journeys, epidemiological investigations are complicated. Generally, cases are reported to public health officials only when the outbreak occurs en route, when many affected passengers debark at a common terminal, or when groups of afflicted passengers travel together in special parties.

During the 1942-45 wartime period, 10 disease outbreaks involving 668 persons, of whom 434 were military personnel, were traced to food or drink consumed on railroad trains. In the next 8 years (1946-53), as the dining car sanitation program gained momentum, 5 outbreaks with 75 cases were reported. Two of these, totaling 40 cases, occurred during one extensive special movement in which railroads were taxed to the limit, requiring the use of much standby equipment and the employment of many extra personnel. Notwithstanding the acknowledged shortcomings of morbidity reporting peculiar to outbreaks among railway passengers, available statistics appear to substantiate the effectiveness of the Service's dining car program.

Training for Employees

Through routine inspections of dining cars in operation, the Public Health Service found that structural improvements alone would not raise sanitation to the desirable level. To reduce the possibility of foodborne illness, employees needed to have a thorough understanding of the principles and reasons for food service sanitation, proper use of equipment, and approved methods of conducting operations. Railroad officials agreed with this conclusion, and intensive training programs became the order of the day, beginning in the 1940's.

Some of these training courses are conducted by the carriers themselves. Some are conducted exclusively by the Public Health Service. But, generally, dining car departments and the Service collaborate closely. Sometimes a dining car is turned into a classroom, and courses are held in commissaries, union halls, or other available meeting rooms. Teaching methods vary, but the emphasis is on informal discussions.



Courtesy of Car Builders' Cyclopedia.

Floor plan of a typical dining car.

Occasionally, carriers make attendance mandatory at training courses; but, for most, it is voluntary. In either case, there usually is little discernible difference in the turnout or level of interest. Crew members seem glad to have the opportunity to discuss their problems and to learn approved methods and standards of food sanitation. Many, of their own volition, attend subsequent training sessions. The Public Health Service issues a wallet-sized Certificate of Attendance to each employee completing the course.

Some carriers have requested refresher courses at 6-month intervals. Dining car employees' organizations have become enthusiastic about the promotion and expansion of such refresher training. Significant improvement in operation of diners has been noted on many carriers, and there have been definite indications that the training sessions have impressed the crews with the importance of the principles of sanitation and hygiene.

One dining car superintendent, whose company in 1 year spent \$8,000 on training courses, remarked, "The improvement in operations accruing from food service employees' training programs is in itself sufficiently substantial a return for the investment made."

Most railroads, in an effort to improve and maintain sanitary conditions on their diners, engage traveling inspectors or inspection teams who board cars in service, observe operations, call attention to defects in equipment and methods, and give instruction in proper food service. A recent innovation has been the training by the Service, of inspectors of certain companies to follow the official Public Health Service inspection procedure. Ratings obtained by these inspectors are not considered official for the purpose of issuing Certificates of Sanitation,

or for computing the annual average rating of their cars. However, this system has proved to be a valuable adjunct to the Service program and has significantly raised the level of sanitation on diners.

Education of employees is a never ending phase of the dining car sanitation program. Personnel of the Service's regional offices give instruction in food service sanitation, interpret regulations for carriers as an aid in the formulation of company rules governing dining car employees, and assist carriers in developing visual aids and other education materials.

In 1953, the Public Health Service produced its first film devoted specifically to the subject of dining car sanitation. This visual aid, actually a filmstrip, is entitled "Food Sanitation in Dining Cars." It was produced with the cooperation of the Association of American Railroad Dining Car Officers and is available to carrier companies or employee organizations.

Many carriers now have company publications devoted exclusively or in part to dining car service. These usually include items on particular phases of sanitation, to serve as constant reminders to crew members that sanitation is a never ending and exceedingly important part of their service.

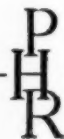
The advancement in dining car sanitation is all the more remarkable when one considers that no railroad has ever, with the exception of the war years, realized a profit from the operation of dining cars (5). Still, development and improvement of dining service are proceeding persistently, and railroads are justifiably proud of their equipment, food, and service.

While the Public Health Service program of dining car sanitation has its legal basis in the Interstate Quarantine Regulations, it has been conducted, historically, on a cooperative and

educational basis with the carriers. The Service is primarily interested, not in arbitrary exercise of its powers, but in a high level of sanitation on dining cars. Because virtually all carriers are intent on the same objective, the program has traditionally had their wholehearted support.

REFERENCES

- (1) Tetzlaff, F., Butrico, F. A., and Resnick, P.: Sanitation on interstate carriers. *Health News* (New York State Department of Health) 31: 4-18, March 1954.
- (2) 27 U. S. Stat. 449.
- (3) Interstate Quarantine Regulations, 42 Code of Federal Regulations 72; also 42 CFR 53 Supp. 72.
- (4) Mendelsohn, I. W.: Modern railway sanitation. *Municipal Sanitation* 2: 322-326, July 1931; 391-393, Aug. 1931; 436-440, Sept. 1931.
- (5) Paden, D. L.: Problems and economics of railroad dining car service. Master's thesis. Bloomington, Ind., Indiana University School of Business, 1952.
- (6) Waters, L. L.: Steel trails to Santa Fe. Lawrence, Kans., University of Kansas Press, 1950, ch. 8.
- (7) Sanitation manual for land and air conveyances operating in interstate traffic [adopted and promulgated by the U. S. Public Health Service, October 2, 1942]. *Pub. Health Rep.* 58: 157-193, Jan. 29, 1943. Reprint No. 2444.
- (8) U. S. Public Health Service: Handbook on sanitation of railroad passenger car construction. Standards of sanitation applicable to the construction of railroad passenger and dining cars. *Public Health Service Pub. No. 83*. Washington, D. C., U. S. Government Printing Office, 1951.
- (9) U. S. Public Health Service: Handbook on sanitation of dining cars in operation. Standards of sanitation for operation and maintenance of food and drink service on railroad passenger cars. *Public Health Service Pub. No. 83*. Washington, D. C., U. S. Government Printing Office, 1951.
- (10) Diners and grill cars for the "Eagles." *Railway Age* 125: 52-57, Sept. 18, 1948.
- (11) New dining cars for the Union Pacific. *Railway Age* 126: 37, April 2, 1949.
- (12) Illinois Central all-electric diner. *Railway Age* 126: 87-89, Mar. 12, 1949.
- (13) What electronics may do on diners. *Railway Age* 122: 784-791, Apr. 19, 1947.
- (14) Pennsylvania experiments with radar cooking. *Railway Age* 126: 48, May 28, 1949.
- (15) Award to Erie for modernized dining service. *Single Service News* (Paper Cup and Container Institute, Inc., New York), Aug.-Sept. 1953, pp. 2-3.
- (16) Dining car sanitation award. *Pub. Health Rep.* 68: 810, August 1953.



Results of the Cancer Teaching Program In Dental Schools

By **RAYMOND F. KAISER, M.D.**

A PROGRAM of grants to dental schools for the integration and improvement of cancer teaching was inaugurated in 1948 as a step toward the control of intraoral neoplastic disease through earlier diagnosis and treatment. The program has been expanded steadily until, at the present time, the National Cancer Institute is administering Public Health Service grants to 43 dental schools throughout the country. The results have been gratifying, especially in that the new generations of practicing dentists are aware of the important part they can play in the early detection of cancer in their patients.

It was the opinion of the staff and advisers of the National Cancer Institute in 1947 that the dental profession could take an important part in cancer control. This feeling was based on a number of factors. Among them was the knowledge that the most effective way to discover cancer in an early stage is through careful periodic examinations. Because the dental profession, through its public education program, has been successful in motivating people to visit their dentists regularly, the dentist has an unequalled opportunity for periodic inspection of the oral cavity among his patients under the most desirable conditions. Therefore,

Dr. Kaiser is chief of the Field Investigations and Demonstrations Branch of the National Cancer Institute, National Institutes of Health, Public Health Service.

the dentist, if properly informed and trained, is in a position to discover many early cases of cancer.

In addition, experience has shown that an appreciably large number of patients with intraoral cancer, particularly cancer of the gingivae, consult their dentist prior to seeking advice from their physician, thereby providing the dentist with the initial opportunity to discover and observe early cancer. Coupled with this is another advantage possessed by a member of the dental profession. That is the opportunity to follow up the patient whom he has advised to seek further medical attention. This followup can be accomplished by the simple procedure of scheduling a dental appointment subsequent to the date the patient was referred for medical attention.

Often the dentist can aid cancer control by searching for and correcting oral conditions which may contribute to the causation of cancer. Finally, the dentist can contribute to the welfare of the cancer patient through proper dental care and preparation of necessary appliances and prostheses.

In 1947, at a joint meeting of the National Cancer Institute and the Council on Dental Education of the American Dental Association, it was agreed that the dental profession in general would be aided if a program were initiated to orient the profession to the specific dental aspects of the cancer problem. It was agreed that this orientation could best be accomplished by an approach to the oncoming generation of dentists through integration and improvement of

oral cancer instruction in the dental schools. With the approval of the National Advisory Cancer Council, the institute undertook a program of grants under which approved dental schools were eligible to receive up to \$5,000 annually.

The history of participation of the 43 schools cooperating in the program has been as follows:

<i>Schools</i>	<i>Year of participation</i>
17-----	7th
16-----	6th
4-----	5th
2-----	4th
2-----	2d
1-----	1st

NOTE: 1 school participated for 2 years but was unable to continue because of personnel problems.

Upon the initiation of the program in each school, a member of the faculty was designated to serve as cancer coordinator. At present the coordinators are distributed in the following disciplines:

Oral pathology-----	11	Histology-----	1
Oral surgery-----	6	Associate dean-----	1
General pathology---	7	Associate professor of	
Oral medicine-----	4	dentistry-----	1
Deans-----	4	Oral diagnostician--	1
Dental medicine----	2	Dental prosthesis---	1
Clinical pathology--	1	Periodontology-----	1

This current distribution reflects a turnover of approximately 25 percent of the coordinators since the inception of the cancer teaching program, although, by and large, the group has remained relatively stable. In the majority of the schools, the coordinator has the benefit of the advice and assistance of a cancer teaching committee, appointed during the initial period of the grants program.

Areas of Deficiency

At the outset of the program these individuals and committees reviewed the teaching of cancer within their own schools and, with the exception of a very few schools, uncovered the following findings in relation to such instruction:

A general belief prevailed within and outside the schools that dentistry was essentially a restorative art and that knowledge of cancer was not pertinent to dental practice.

The teaching of oral cancer was unorganized, uncoordinated, nonsystematic, and casual.

There was not time in the dental curriculum for courses other than those concerned with restorative dentistry.

A scarcity of suitable teaching material existed among patients admitted primarily for dental treatment.

Little or no histopathological cancer material was available.

Practically no student slide collections of cancer were available.

Very little opportunity existed for students to observe cases of clinical cancer either on a demonstration basis or through clinic or hospital experience.

Teaching materials and equipment were inadequate to provide instruction on the cancer problem.

Experienced personnel qualified to provide cancer instruction were insufficient.

There was generally inadequate correlation between preclinical and clinical teaching.

These represent, in general, the major areas of deficiency encountered by representatives of the schools, although others of varying degree and type existed in some schools.

Allocation of Funds

It was recognized on initiating the cancer teaching program that the most effective methods of improving cancer instruction would vary from school to school, and it was decided that each school should have the opportunity to develop the type of program which best met its particular circumstances.

An analysis of the funds requested by the dental schools gives some indication of the uses to which the schools put the grants. In the first year of operation the total grants for all participating schools were distributed in this manner: 57 percent for personnel, 19.1 percent for permanent equipment, 13 percent for consumable supplies, 5.9 percent for travel, 2.4 percent for other expense, and 2.6 percent for overhead. In 1954 the funds requested were distributed in the following manner: 75.7 percent for personnel, 8.0 percent for permanent equipment, 5.9 percent for consumable supplies, 4.5 percent for travel, 0.4 percent for other ex-

pense, and 5.5 percent for overhead. During the course of the program there has been a general tendency to increase the percentage for personnel and overhead and to decrease the percentage in the other categories—consumable supplies, permanent equipment, travel, and other expense.

More Time and Materials

The schools have shown many similarities in their efforts to improve cancer teaching. All of the schools in one way or another have been able to rearrange their curriculums to add a sizable number of clock hours of cancer instruction in both didactic lectures and laboratory exercises. Additional emphasis has been placed on cancer in oral pathology by 36 schools, general pathology by 27, oral diagnosis by 24, oral surgery by 23, oral medicine by 4, dental medicine by 2, prosthetics by 1, and periodontia by 1. In addition, new courses of various types specifically concerned with oral cancer have been added to the curriculum by 25 schools.

Since effective teaching in oral cancer, as in any type of cancer instruction, is directly related to the quantity and quality of clinical material available for presentation, 24 schools have supplemented their clinical teaching by arranging for their students to participate in tumor clinic activities through association or affiliation with teaching hospitals. Two additional schools have organized their own clinics or oral diagnostic centers; 11 additional schools present patients to students through demonstration clinics; and 2 schools accomplish this by means of ward walks. Sixteen schools conduct tumor conferences as a part of their teaching programs. Thus, an increasing number of dental students have an opportunity to observe patients with cancer in all stages of the disease and to become familiar with differential diagnosis along with the various methods of therapy.

To increase histopathology material for student instruction, 26 schools have established a biopsy diagnostic service for dental practitioners. In most instances this tissue service was established by the expansion of existing facilities through the purchase of equipment and the acquisition of technicians under the grants,

but in 9 schools grant funds were used to initiate and establish new tissue laboratories. In all 26 schools student work with tissue slides has been markedly increased, and for the first time adequate individual student slide collections have been made available. Four schools require students to attend autopsy examinations of cancer patients. In the schools providing this biopsy service there has been a marked, steady increase in the number of biopsy specimens received. Without exception the schools consider this increase one measure of the success of their cancer teaching program since recent graduates are contributing the greater share of the biopsy specimens. Twenty-four schools demonstrate how to take a biopsy, while in 16 schools the student is required to take one or more biopsies and follow through the processing of the specimen to the histological slide.

The grant program has made it possible for all participating dental schools to strengthen their visual education and teaching materials. These vary from school to school but include color photographs of cancer lesions, lantern slides, histopathological slides, photomicrographs, exhibits, specimen displays, mouldages, models, films, and filmstrips as well as equipment such as cameras, projectors, screens, slide viewers, microscopes, and scopicons. Four schools have prepared short films on biopsy techniques for the instruction of students as well as practitioners.

Enlarged Staffs

Further evidence that the schools' interest in cancer teaching has increased in spite of the limited amount of the grants is the fact that 13 professional persons and 21 nonprofessional laboratory technicians, photographers, and a laboratory secretary have been added to the staffs of the schools as a direct result of these grants. In addition, numerous staff members have contributed time and effort toward the teaching program without any monetary recompense from the grants. In the field of personnel, two schools have used some of their funds for teacher training.

The grants have stimulated nine schools to undertake cancer and other research activities, and they have established programs which pro-

vide students the opportunities for investigative work.

Special lectures and seminars have been used by 24 schools as a method to increase cancer instruction. As in many teaching programs, and this one is no exception, the cancer teaching spills over from the undergraduate area into the postgraduate. Students, as well as practitioners, participate in the lectures and seminars mentioned above. "Ten schools have established specific programs of postgraduate education. One of these has initiated a case history service for practitioners, and the remainder offer refresher courses and special or postgraduate courses for practitioners and graduate students.

This summation of specific accomplishments as a result of the stimulation of cancer teaching grants is based on special reports from the individual schools expressing objectively the actual results attributable to the grants and a personal knowledge of the programs in a number of the schools gained through field visits by the staff of the National Cancer Institute. Many of the coordinators have expressed the belief that a cancer learning test developed for dental schools is valuable for measuring the improvement of cancer teaching within their institutions. Twelve schools have reported a steady improvement in the scores of their students during the years they have participated in the testing program.

Summary

A number of years have gone by since the initiation of the cancer teaching program, and

it is now possible to take a long-range view of its effect and to enumerate a number of general accomplishments:

- It has made possible the expansion of oral cancer instruction and increased the curriculum time devoted to cancer teaching.

- It has increased clinical material for dental students.

- It has increased student participation in clinical cancer activities.

- It has promoted the development and utilization of teaching materials, facilities, and equipment.

- It has helped correct the traditional view that knowledge of cancer was not pertinent to dentistry and helped to clarify the role of the dentist in control of the disease.

- It has strengthened cooperative relationships between the medical and dental professions.

- It has increased the dental students' awareness of cancer and has impressed on him his responsibility for the early recognition of cancer.

- It has developed teaching personnel within dental staffs.

- It has augmented and enhanced the quality of oral cancer instruction.

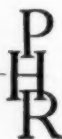
- It has increased cancer facilities and services.

- It has stimulated the establishment of diagnostic biopsy services.

- It has stimulated and expanded research interests of dental school facilities.

- It has pointed up the need for cancer instruction in postgraduate fields.

- Lastly, it has accomplished a general improvement in the teaching of oral cancer.



In a New York State Health Department study, a comparison of original death certificates and certificates prepared from autopsy protocols revealed an appreciable degree of inaccuracy in cause-of-death statements.

Accuracy of Cause-of-Death Statements On Death Certificates

By GEORGE JAMES, M.D., M.P.H., ROBERT E. PATTON, M.P.H.,
and A. SANDRA HESLIN, M.S.

THE BASIC DATA on which public health activities have been planned have come primarily from vital statistics. Birth and death certificates have provided information essential to the operation of nearly all health programs. Since the start of the vital registration systems in this country, the emphasis has been on completeness of reporting. The entrance of a State into the birth or death registration area was determined primarily by its achieving a stated percentage of completeness of reporting, and no other criterion for accuracy in vital statistics has yet been generally employed.

Dr. James, with the New York State Department of Health continuously since 1949, is now assistant commissioner for program development and evaluation. He is also associate professor of preventive medicine and public health, Albany Medical College. Mr. Patton, formerly associate statistician, bureau of statistics, New York State Department of Health, is now assistant director of the New York State Department of Mental Hygiene. Miss Heslin is a biostatistician with the State department of health.

Questions have been raised, however, as to the accuracy of the information on these certificates, and some attempts have been made to assess the accuracy of various items. Swartout and Webster (1) reviewed earlier studies of the accuracy of cause-of-death statements and compared autopsy diagnoses for 8,080 persons in Los Angeles Hospital with the cause of death which they believed would have been listed had no autopsy been performed. They found 79 percent agreement between the diagnoses, with the percentage by categories varying from 100 percent for measles, scarlet fever, and cancer of the mouth to 16 percent for softening of the brain. When they used broader categories for their comparisons, the agreement reached 90 percent. Agreement was only 50 percent for those patients who were admitted to the hospital within 48 hours of death. All diagnoses were made by the authors themselves, using the fifth revision of the International List of Causes of Death, and multiple causes were resolved through the Manual of Joint Causes. They did not study the actual certificates filed by the attending physician.

In 1949, Dr. A. G. Evans, in an unpublished study, analyzed a sample of 3,900 from a total

of 161,600 death certificates for the years 1946 and 1947. Based upon his own judgment as to what constituted a satisfactory statement of the cause of death and without any consideration of autopsy data, he discovered that 57 percent were defective. Of this defective group, almost half had incomplete medical certification, 24 percent used obsolete or unacceptable terms, and 28 percent represented inaccurate medical certification. He suggested greater emphasis on querying of death certificates by health officers. On the average, only about 3 percent of death certificates in the Nation as a whole are queried, and, according to a recent survey, only 8 State and Territorial health departments estimate that they are querying more than 5 percent of death certificates submitted (2).

Pohlen and Emerson (3) obtained cause-of-death data based on both ante-mortem and post-mortem findings from 15 cooperating hospitals in New Jersey and New York State. Deaths from cancer were analyzed in an attempt to determine the accuracy of the diagnosis and of the determination of the anatomical site of the cancer when based on clinical data alone. Of 3,462 deaths found at autopsy to have been due to cancer of various sites, the diagnosis for 77 percent was etiologically correct; for 77 percent it was topologically correct; and for 67 percent it was correct in both ways. Cancers of certain sites, such as the breast, the pharynx, and the rectum, were correctly diagnosed ante mortem relatively more often than were those of sites such as the brain, the liver, and the bile ducts. In addition, the autopsy data revealed that 148 deaths attributed to cancer on the clinical diagnosis were actually due to some other cause.

Korns and Lintz (4) concluded from a review of 500 autopsy protocols from 5 hospitals that there was an 11 to 20 percent disagreement between the medical statements appearing on death certificates and the pathological findings at autopsy. They used the fifth revision of the International List of Causes of Death and the Manual of Joint Causes.

The present study was made to determine how closely the reporting of the cause of death under the current system tallies with the best possible estimation of the facts. The initial

problem was to determine what could be used as a standard for comparison; in other words what was the "true" underlying cause of death? In general, a diagnosis made on the basis of a complete, competently performed autopsy and a good clinical history is as close to the truth as modern medical science can come. This procedure, of course, does not completely solve the problem, because the pathologist does not and cannot always state the underlying cause of death singly and unequivocally. Multiple factors may be present, any one of which could cause death or whose effect may lie only in their particular combination. The present vital statistics system, however, is geared in such a way that each death must be attributed to one and only one cause. Needed to measure the accuracy of this system, therefore, is a theoretically true underlying cause of death, defined as that cause of death which a well-trained physician would enter on the death certificate after he had obtained all possible information, including a clinical history and findings of a complete autopsy. In this study, such a theoretically true cause of death was determined for a large number of deaths occurring in upstate New York and compared with the cause entered on the original death certificate. Data obtained were then used to evaluate the accuracy of the cause-of-death statements on the original certificates.

Study Method

The records of all autopsied deaths occurring in 12 hospitals in the Albany, N. Y., region in 1951 and 1952 were examined by a team of three third-year medical students working under the junior public health intern program of the New York State Department of Health. These students had received special training in how to complete a medical certification section of a death certificate, and their abilities in this regard were tested carefully by the authors. Each autopsy protocol, including the clinical summary, was reviewed, and if the autopsy was complete, a standard death certificate was filled out, the pathologist's results being used in completing the cause-of-death statement. A total of 1,889 such certificates were completed and analyzed. All of the pathology services in

the cooperating hospitals were under the direction of a physician qualified under New York State's public health law, which requires qualifications equal to those required by the American Board of Pathology.

These certificates, called autopsy certificates in this report, were then coded by the regular coding staff of the New York State Department of Health according to the sixth revision of the International Lists of Diseases and Causes of Death in the same manner as are all death certificates. The regularly filed death certificate, called original certificate, was then examined for each of these cases, and the originally coded cause of death was entered on the completed autopsy certificate. The data were grouped according to 30 broad categories of cause of death similar to those used by the New York State Department of Health in its published vital statistics reports.

In developing the method used in this study, two questions had to be answered by small methodological studies:

1. Could the three reviewers, working independently, draw the same conclusions as to the underlying cause of death from identical autopsy data?

To answer this question, each of the three reviewers prepared autopsy death certificates from a series of 50 consecutive autopsy protocols from the files of a teaching hospital. For 46 of the 50 cases (92 percent), there was complete agreement within New York State's vital statistics groupings; for 2 cases (4 percent) 2 of the three reviewers were in agreement; for the remaining 2 (4 percent) each reviewer listed a different cause of death. Of the 46 autopsy certificates on which all 3 agreed, there was disagreement with the original certificate on 6 (13 percent). When each reviewer was tested

Table 1. Number of deaths by cause according to original death certificate and autopsy certificate

Cause of death ¹	Number according to original certificate	Number according to autopsy certificate	Percent change when autopsy data were used
Total	1, 889	1, 889	
Tuberculosis (001-019)	48	56	16. 7
Syphilis (020-029)	12	5	-58. 3
Other infective and parasitic diseases (040-138)	28	28	0
Malignant neoplasms (140-205)	402	409	1. 7
Other neoplasms (210-239)	15	14	-6. 7
Diabetes mellitus (260)	36	16	-55. 6
Vascular lesions affecting central nervous system (330-334)	131	119	-9. 2
Various diseases of sense organs (340-399)	21	25	19. 0
Rheumatic fever (400-402)	5	4	-20. 0
Chronic rheumatic heart disease (410-416)	41	50	22. 0
Arteriosclerotic heart disease (420)	276	267	-3. 3
Chronic endocarditis (421, 422)	23	20	-13. 0
Other diseases of heart (430-434)	10	6	-40. 0
Hypertension with heart disease (440-443)	41	19	-51. 2
Hypertension (444-447)	29	41	41. 4
General arteriosclerosis (450)	17	36	111. 7
Other diseases of arteries (451-456)	18	24	33. 3
Other diseases of circulatory system (460-468)	8	4	-50. 0
Chronic and unspecified nephritis (592-594)	23	26	13. 0
Acute nephritis and nephrosis (590, 591)	6	9	50. 0
Pneumonia, except pneumonia of newborn (490-493)	57	57	0
Other respiratory diseases (470-527, excluding 490-493)	33	33	0
Diseases of digestive system (530-587)	171	181	5. 8
Hyperplasia of prostate (610)	12	16	33. 3
Congenital malformations (750-759)	62	71	14. 5
Certain diseases of early infancy (760-776)	121	111	-8. 3
Senility and ill-defined causes (780-795)	6	5	-16. 7
Accidents, poisonings, and violence (E800-E962)	156	165	5. 8
Suicide, homicide, etc. (E963-E999)	14	12	-14. 3
All others (241-252, 261-289, 290-299, 300-326, 600-609, 611-749)	67	60	-10. 4

¹ Numbers in parentheses are category numbers of the sixth revision of the International Lists of Diseases and Causes of Death.

Table 2. Distribution of deaths according to cause given on original

Cause of death according to original certificate ¹	Cause of death, by International List									
	Total	001-019	020-029	040-138	140-205	210-239	260	330-334	340-399	400-402
Total.....	1, 889	56	5	28	409	14	16	119	25	4
Tuberculosis (001-019).....	48	45			1					
Syphilis (020-029).....	12		3					2		
Other infective and parasitic diseases (040-138).....	28	1		16	1				5	
Malignant neoplasms (140-205).....	402			1	372	5		5		
Other neoplasms (210-239).....	15				3	5		3		
Diabetes mellitus (260).....	36						11	2		
Vascular lesions affecting central nervous system (330-334).....	131	3		1	4			78	2	
Various diseases of sense organs (340-399).....	21	1		1	1			1	12	
Rheumatic fever (400-402).....	5									
Chronic rheumatic heart disease (410-416).....	41	1								2
Arteriosclerotic heart disease (420).....	276	3			10		1	5		
Chronic endocarditis (421, 422).....	23				1		1	4		
Other diseases of heart (430-434).....	10									
Hypertension with heart disease (440-443).....	41		1				1	4		
Hypertension (444-447).....	29	2			1			2		
General arteriosclerosis (450).....	17				1			2		
Other diseases of arteritis (451-456).....	18		1					3		
Other diseases of circulatory system (460-468).....	8				1			1		
Chronic and unspecified nephritis (592-594).....	23							2		2
Acute nephritis and nephrosis (590, 591).....	6									
Pneumonia, except pneumonia of newborn (490-493).....	57			2	3		1	2	1	
Other respiratory diseases (470-527, excluding 490-493).....	33			2	1			1		
Diseases of digestive system (530-587).....	171			1	7	1				
Hyperplasia of prostate (610).....	12				2					
Congenital malformations (750-759).....	62					1			3	
Certain diseases of early infancy (760-776).....	121									
Senility and ill-defined causes (780-795).....	6									
Accidents, poisonings, and violence (E800-E962).....	156			1				2	1	
Suicide, homicide, etc. (E963-E999).....	14									
All others (241-252, 261-289, 290-299, 300-326, 600-609, 611-749).....	67			3		2	1		1	

separately against the 50 original certificates, the disagreements were 8, 8, and 9, or 16, 16, and 18 percent. Hence, not only did the reviewers agree well among themselves, but each disagreed about equally with the original. Although this test did not provide conclusive evidence that there was no reviewer bias, it was decided to permit each reviewer to work independently on different sets of autopsy protocols and to combine their results for the final analysis.

2. If there should be marked differences between the autopsy and original certificates, how would it be known that it was partly due to the additional data uncovered at autopsy instead of wholly to avoidable errors by the physician who completed the death certificate?

To answer this question, the reviewers, working as a team, studied the ante-mortem clinical

records for 98 consecutive autopsied deaths, agreed upon a medical certification of death for each, and prepared new death certificates without reference to autopsy data. Then they studied the autopsy protocols and prepared another set of certificates based upon all available information. If the certificates prepared from the clinical records did not compare much more favorably with the autopsy certificates than did the original ones, the errors in cause-of-death statements on the originals could not be attributed wholly to avoidable errors by the physician who completed the death certificate.

When the three sets of certificates were compared, it was found that the original and autopsy certificates for 20 (20 percent) of the 98 deaths studied disagreed, but that in only 4 of these did the certificate prepared from the clinical records agree with the autopsy certificate.

certificate, by cause given on autopsy certificate

numbers, according to autopsy certificate

410-416	420	421-422	430-434	440-443	444-447	450	451-456	460-468	592-594	590-591	490-493	470-527	530-587	610	750-759	760-776	780-795	800-962	963-999	All others	Percent of certificates agreeing
50	267	20	6	19	41	36	24	4	26	9	57	33	181	16	71	111	5	165	12	60	71.0
							7					1	1								93.8
	1										2				1	1					25.0
	6						1		1		1	1	5					1		3	57.1
	1											1								2	92.5
	8			2	8	5			2	1	1		3							1	33.3
2	8					2			3		5		5	1			1	4		2	30.6
1	1									1	1							1			59.5
3	1					1															57.1
30	1	2	1				1		1		2										0
3	201	8		4	1	14	2				2	5	6	1	1		1	4		4	73.2
1	5	5	1			2			1				2								72.8
2	3	1									1		1		2						21.7
4	3	1	1	7	13	1	1				2	1						1			0
	3			4	9	1			3		1		3								17.1
1	4					4							5								31.0
	1					1	11														23.5
								3			1		1					1			61.1
							1		12	1		1						1			37.5
										3			1							2	52.2
	6		2		1	1		1		1	25	1	5		1		1	3			50.0
	2			1		1			1		3	11	3					1		6	43.9
2	5	3	1	1	2	2					5	2	135				1			3	33.3
														10							78.9
											1				52	3		1		1	83.3
												2	1		13	105					83.9
										1	2						1		1	1	86.8
	1				1	1						4	1			1	1	136	5	1	0
																		8	6		87.2
1	6								2	1	2	3	3	4	1			3		34	42.9
																					50.7

¹ Numbers in parenthesis are category numbers of the sixth revision of the International Lists of Diseases and Causes of Death.

Hence, if the physician had completed the certificate properly on the basis of the ante-mortem evidence, agreement between the original and autopsy certificates would have been only 4 per cent greater. It was concluded that in this sample, taken from a large teaching hospital where physician practices on death certification were good, there was an appreciable amount of new information supplied by autopsy which could refine the cause-of-death statistics.

This study made no attempt to assess the physician error in recording the ante-mortem data for the total group of 1,889 cases separately from the error due to inadequate information. The methodological study mentioned above was taken as an indication that a sizable portion of the difference between the autopsy and the

original certificates was due to additional data found at post mortem.

Cause-of-Death Comparisons

Table 1 shows the deaths tabulated by cause groups, both by the original coding and the coding of the autopsy certificates. As can be seen, inaccuracies in the original cause-of-death statement led to an overstatement or understatement of the importance of several major causes of death. For instance, the use of autopsy data changed the number of deaths from tuberculosis (001-019) from 48 to 56. Since the deaths studied were not a representative sample of deaths in the State, this finding cannot be considered as proof that the death rate from tu-

berculosis as given by the reports of the New York State Department of Health is too low. It merely suggests that there may be some underreporting of deaths due to tuberculosis.

Although the number of deaths from syphilis and its sequelae (020-029) was numerically small, there was a significantly large difference in the number of deaths from this cause when the autopsy data were used. Furthermore, an investigation of the incorrectly allocated certificates showed that the difference could be attributed to deaths from "aneurysm of the aorta." Of the 8 deaths ascribed to this cause on the original certificate, 7 of them were found at autopsy to be nonsyphilitic. Three of these certificates had been queried to discover whether or not the aneurysm was syphilitic, but the physician certifying the death in each case had not replied to the query. If this practice of listing "aneurysm of the aorta" as the cause of death occurs throughout the State, many of the deaths attributed to syphilis are wrongly allocated.

The cardiovascular renal group as a whole (330-334, 400-468, and 592-594) showed little change, although there were many differences within the group. The number of deaths attributed to general arteriosclerosis (450) showed a significantly large increase when autopsy data were used. The hypertensive heart disease group (440-443), in particular, showed a significantly large decrease. The lack of

clinical information or the lesser attention given to this group of diseases by pathologists may be a partial explanation for these differences, as well as for the significantly large decrease in the proportion of deaths attributed to diabetes mellitus (260). In certifying these deaths, the physician may have given more weight to clinical information than did the pathologist.

Certain categories, such as malignant neoplasms and accidents, were relatively unchanged by the use of autopsy data. The cause of death in these categories seemed to be relatively well reported.

Although the similarity, rather than the difference, in the overall distribution of the two groups of records by cause of death is perhaps the striking factor in table 1, it can be seen from table 2, which shows the distribution of the deaths by the cause given on the original certificate and by the cause given on the autopsy certificate, that the similarity is due in part to compensating errors. Actually, there was complete agreement between the originally coded four-digit cause of death and the four-digit cause coded on the autopsy certificate for only 865, or 45.8 percent, of the deaths. There was agreement for 52.2 percent of the deaths in terms of three-digit codes as used in the International List and for 71.0 percent in terms of the 30 broad cause groups shown in table 2. Thus, slightly more than one-fourth of the deaths were certified in such a way as to be

Table 3. Distribution of deaths by age and sex, upstate New York, 1951, and study group

Age in years	Total number deaths		Males				Females			
			Number deaths		Percent of total		Number deaths		Percent of total	
	Upstate	Study	Upstate	Study	Upstate	Study	Upstate	Study	Upstate	Study
Total	75, 632	1, 889	41, 373	1, 250	54. 7	66. 3	34, 259	639	45. 3	33. 7
Under 1	3, 725	223	2, 152	122	2. 8	6. 5	1, 573	101	2. 1	5. 3
1-14	1, 190	72	702	38	. 9	2. 0	488	34	. 6	1. 8
15-24	898	47	624	35	. 8	11. 9	274	12	. 4	. 6
25-34	1, 460	72	834	42	1. 1	2. 2	626	30	. 8	1. 6
35-44	3, 083	130	1, 783	83	2. 4	4. 4	1, 300	47	1. 7	2. 5
45-54	6, 964	313	4, 287	226	5. 7	12. 0	2, 677	87	3. 5	4. 6
55-64	13, 556	422	8, 449	304	11. 2	16. 1	5, 107	118	6. 8	6. 2
65-74	19, 082	382	10, 777	254	14. 2	13. 4	8, 305	128	11. 0	6. 8
75-84	18, 179	194	8, 702	124	11. 5	6. 6	9, 477	70	12. 5	3. 7
85 and over	7, 495	34	3, 063	22	4. 1	1. 2	4, 432	12	5. 9	. 6

classified in a different major group, but compensating errors did decrease these differences, as shown in table 1.

The deaths allocated to pneumonia are a good example of the compensating effect of the differences in allocating causes of death on the two groups of certificates. According to the original certificate, there were 57 deaths from pneumonia among the 1,889 studied. There were also 57 deaths attributed to pneumonia on the autopsy certificates, but only 25 of these 57 were the same ones. In other words, less than one-half of the deaths attributed to pneumonia were actually due to pneumonia according to the autopsy report, but other errors completely compensated for this error.

Characteristics of Study Group

As previously mentioned, the deaths included in this study are not a representative sample of all deaths in upstate New York, nor are the hospitals in which they occurred a representative sample of all hospitals.

Table 3 shows the differences in the age and sex composition of the study group and of all deaths in upstate New York in 1951. There is a lower proportion of deaths in the study group at ages 65 years and over for males and at ages 55 years and over for females. Table 4 shows some marked differences in the distribution of deaths by cause for the study group and for all deaths. These differences undoubtedly occurred because deaths from certain causes are selectively autopsied. The great underrepresentation of deaths due to heart disease in the study group indicates that the conclusion regarding the inaccuracy of reporting of death due to this cause is conservative. One might expect that the differences between the stated and "true" cause of death among nonhospital heart disease deaths would be greater than among the study group since physicians attending persons dying at home from heart disease may have seen their patients only in the terminal stages and may not have had access to the diagnostic facilities of a modern hospital.

Tables 5 and 6 show the proportion of the deaths in upstate New York in 1952 that occurred in a hospital and the proportion that came to autopsy. The percentage of the deaths

from such conditions as cancer, tuberculosis, acute nephritis, and diseases of the digestive system occurring in hospitals is much higher than the percentage of deaths from such a cause as heart disease. Of all causes of death, cancer, tuberculosis, pneumonia, diseases of the digestive system, accidents, and some of the diseases of infancy stand out as those selectively brought to autopsy. On the other hand, several extremely significant causes of death, such as arteriosclerotic heart disease, diabetes, and vascular lesions affecting the central nervous system, are decidedly underrepresented among the autopsied deaths. This latter group of disorders is frequently difficult to diagnose and is often found in association with many other degenerative processes. That the cause-of-death data in the degenerative diseases lack a firm basis is further substantiated by the data in tables 7 and 8. At the older ages when these diseases are particularly prevalent, the proportion of all deaths autopsied is especially low.

Discussion

Inaccuracies in cause-of-death data may occur because:

1. The physician does not list the available material correctly on the death certificate.
2. The clinical and laboratory data available before an autopsy is performed are not sufficient to enable the physician to determine the cause of death correctly.
3. In some cases where all information, including the autopsy data, is available, it is still difficult to decide on one underlying cause of death.

The present study did not seek to assess numerically the factor of the physician's ability to record information correctly on the original certificate, although this factor was considered in the analysis of the cause of death among the 98 consecutive autopsies performed in a medical school teaching hospital with excellent attending physicians, house staff, consultants, and laboratory facilities. Using ante-mortem data of unusually high quality, the resulting diagnosis of cause of death on the so-called clinical certificate was quite similar to

Table 4. Distribution of deaths by cause, upstate New York, 1951, and study group according to original certificate

Cause of death ¹	Study group		Upstate New York	
	Number	Percent	Number	Percent
Total.....	1, 889	100. 00	75, 632	100. 00
Tuberculosis (001-019).....	48	2. 54	1, 140	1. 51
Syphilis (020-029).....	12	. 64	221	. 29
Other infective and parasitic diseases (040-138).....	28	1. 48	243	. 32
Malignant neoplasms (140-205).....	402	21. 28	12, 047	15. 93
Other neoplasms (210-239).....	15	. 79	225	. 34
Diabetes mellitus (260).....	36	1. 91	1, 400	1. 85
Vascular lesions affecting central nervous system (330-334).....	131	6. 93	8, 034	10. 62
Various diseases of sense organs (340-399).....	21	1. 11	670	. 89
Rheumatic fever (400-402).....	5	. 26	87	. 11
Chronic rheumatic heart disease (410-416).....	41	2. 17	1, 071	1. 42
Arteriosclerotic heart disease (420).....	276	14. 61	21, 916	28. 97
Chronic endocarditis (421, 422).....	23	1. 22	4, 875	6. 44
Other diseases of heart (430-434).....	10	. 53	633	. 84
Hypertension with heart disease (440-443).....	41	2. 17	3, 729	4. 93
Hypertension (444-447).....	29	1. 54	638	. 84
General arteriosclerosis (450).....	17	. 90	1, 987	2. 63
Other diseases of arteries (451-456).....	18	. 95	270	. 36
Other diseases of circulatory system (460-468).....	8	. 42	139	. 18
Chronic and unspecified nephritis (592-594).....	23	1. 22	959	1. 27
Acute nephritis and nephrosis (590, 591).....	6	. 32	95	. 13
Pneumonia, except pneumonia of newborn (490-493).....	57	3. 02	1, 534	2. 03
Other respiratory diseases (470-527, excluding 490-493).....	33	1. 75	868	1. 15
Diseases of digestive system (530-587).....	171	9. 05	2, 785	3. 68
Hyperplasia of prostate (610).....	12	. 64	291	. 38
Congenital malformations (750-759).....	62	3. 28	927	1. 23
Certain diseases of early infancy (760-776).....	121	6. 41	2, 371	3. 13
Senility and ill-defined causes (780-795).....	6	. 32	241	. 32
Accidents, poisonings, and violence (E800-E962).....	156	8. 26	3, 929	5. 19
Suicide, homicide, etc. (E963-E999).....	14	. 74	872	1. 15
All others (241-252, 261-289, 290-299, 300-326, 600-609, 611-749).....	67	3. 54	1, 405	1. 87

¹ Numbers in parentheses are category numbers of the sixth revision of the International Lists of Diseases and Causes of Death.

that made by the physician on the original certificate. Nevertheless, there existed a large difference between either the clinical or original and the autopsy certificate. This study emphasized the source of inaccuracy listed as number 2, that is, the lack of sufficient information to determine the "true" cause of death.

It is not possible to compare the results of this study directly with those of the studies by Swartout and Webster or by Korn and Lintz. In both of those studies, cause data were categorized according to the fifth revision of the International List and the Manual for Joint Causes, whereas in this study the underlying cause specified according to the sixth revision of the International List by the person completing the death certificate was accepted by the vital statistics coding unit. Nevertheless, the results are generally similar in that they dem-

onstrate an appreciable degree of inaccuracy in general cause-of-death data.

Epidemiological studies based upon mortality data gleaned from death certificates present elaborate analyses, by age, sex, and other factors, while accepting with little question the accuracy of the basic record itself. Concern over accuracy of the specific measurement of cause of death should precede the question of the association of these causes with certain characteristics of the general population:

The present study points out a paradox: Although a large number of death certificates give an inaccurate cause of death, this error does not necessarily exert a great influence on the overall cause-of-death statistics. Approximately the same number of deaths from cancer, for example, are reported to be due to heart disease as there are heart disease deaths which are at-

tributed to cancer. This observation, however, is made for autopsied deaths among hospitalized patients, and the same compensating effect of the errors may not be found for other deaths. Within certain cause-of-death classifications, the assignment by the physician of the underlying cause of death seems to behave like a statistically random process. Even if this group of deaths were a representative sample of all

deaths in New York State, the autopsy results would change the cause-specific death rates significantly in only a few of the categories; namely, syphilis, diabetes, hypertension with heart disease, generalized arteriosclerosis, and hypertension.

Although such a compensating mechanism may give us more confidence in the overall mortality statistics, it raises serious doubts about

Table 5. Hospital and autopsied deaths among males, by cause, upstate New York, 1952

Cause of death ¹	Total		Hospital deaths			Hospital autopsied deaths		
	Number deaths	Per cent	Number deaths	Percent of total deaths	Percent of total hospital deaths	Number deaths	Percent of total deaths	Percent of total hospital autopsied deaths
Total	43,352	100.0	25,206	58.1	100.0	7,049	16.2	100.1
Tuberculosis (001-019)	769	1.8	673	87.5	2.7	293	38.1	4.2
Syphilis (020-029)	161	.4	137	85.1	.5	42	26.1	.6
Malignant neoplasms (140-205)	6,270	14.5	3,932	62.7	15.6	1,293	20.6	18.3
Diabetes mellitus (260)	521	1.2	309	59.3	1.2	49	9.4	.7
Rheumatic fever (400-402)	31	.1	26	83.9	.1	15	48.4	.2
Vascular lesions affecting central nervous system (330-334)	3,704	8.5	2,333	63.0	9.3	329	8.9	4.7
Chronic rheumatic heart disease (410-416)	512	1.2	322	62.9	1.3	117	22.8	1.7
Arteriosclerotic heart disease (420)	14,761	34.1	6,605	44.7	26.2	1,318	8.9	18.7
Chronic endocarditis (421, 422)	2,174	5.0	1,151	52.9	4.6	100	4.6	1.4
Other diseases of heart (430-434)	329	.8	166	50.4	.7	47	14.3	.7
Hypertension with heart disease (440-443)	1,596	3.7	1,062	66.5	4.2	187	11.7	2.7
Hypertension (444-447)	295	.7	174	59.0	.7	36	12.2	.5
General arteriosclerosis (450)	873	2.0	548	62.8	2.2	81	9.3	1.2
Other diseases of arteries (451-456)	184	.4	130	70.6	.5	76	41.3	1.1
Other diseases of circulatory system (460-468)	87	.2	60	69.0	.2	33	37.9	.5
Chronic and unspecified nephritis (592-594)	452	1.0	297	65.7	1.2	54	11.9	.8
Acute nephritis and nephrosis (590, 591)	62	.1	47	75.8	.2	21	33.9	.3
Pneumonia, except pneumonia of newborn (490-493)	944	2.2	726	76.9	2.9	291	30.8	4.1
Diseases of digestive system (530-587)	1,841	4.2	1,588	86.2	6.3	673	36.6	9.5
Hyperplasia of prostate (610)	263	.6	218	82.9	.8	53	20.2	.8
Congenital malformations (750-759)	501	1.2	445	88.8	1.8	240	47.9	3.4
Certain diseases of early infancy (760-776)	1,447	3.3	1,415	97.8	5.6	463	32.0	6.7
Senility and ill-defined causes (780-795)	119	.3	37	31.1	.1	9	7.6	.1
Accidents, poisonings, and violence (E800-E962)	2,682	6.2	1,255	46.8	5.0	574	21.4	8.1
Suicide, homicide, etc. (E963-E999)	714	1.6	141	19.7	.6	79	11.1	1.1
Other infective and parasitic diseases (030-139)	195	.4	164	84.1	.6	80	41.0	1.1
Neoplasms (210-239)	106	.2	78	73.6	.3	37	34.9	.5
Various diseases of sense organs (335-398)	367	.8	239	65.1	.9	95	25.9	1.3
Influenza and bronchitis (480-483, 500-502)	153	.4	77	50.3	.3	31	20.3	.4
All others	1,239	2.9	851	68.7	3.4	333	26.9	4.7

¹ Numbers in parentheses are category numbers of the sixth revision of the International Lists of Diseases and Causes of Death.

the use of present death-certificate data for research purposes, particularly in the field of chronic degenerative diseases. Epidemiological studies of deaths from heart disease, for example, based on such artifacts must be reexamined to determine whether there are significant biases in the way the errors are associated with the factors under investigation. Material to be used for such studies must first be refined, es-

pecially since the deaths from heart disease are so underrepresented among autopsied deaths.

Suggestions for Improvement

This study, as well as others cited, indicates a need for the consideration of procedures that will improve the accuracy and, consequently,

Table 6. Hospital and autopsied deaths among females, by cause, upstate New York, 1952

Cause of death ¹	Total		Hospital deaths			Hospital autopsied deaths		
	Number deaths	Percent	Number deaths	Percent of total deaths	Percent of total hospital deaths	Number deaths	Percent of total deaths	Percent of total hospital autopsied deaths
Total	36, 198	100. 1	21, 647	59. 8	99. 9	4, 174	11. 5	99. 6
Tuberculosis (001-019)	269	. 7	229	85. 1	1. 1	74	27. 5	1. 8
Syphilis (020-029)	68	. 2	54	79. 4	. 2	12	17. 6	. 3
Malignant neoplasms (140-205)	5, 991	16. 6	3, 532	59. 0	16. 3	781	13. 0	18. 7
Diabetes mellitus (260)	955	2. 6	613	64. 2	2. 8	83	8. 7	2. 0
Rheumatic fever (400-402)	31	. 1	25	80. 6	. 1	13	41. 9	. 3
Vascular lesions affecting central nervous system (330-334)	4, 770	13. 2	2, 787	58. 4	12. 9	269	5. 6	6. 4
Chronic rheumatic heart disease (410-416)	575	1. 6	355	61. 7	1. 6	123	21. 4	2. 9
Arteriosclerotic heart disease (420)	10, 116	28. 0	5, 386	53. 2	24. 9	651	6. 4	15. 6
Chronic endocarditis (421, 422)	2, 234	6. 2	1, 093	48. 9	5. 0	56	2. 5	1. 3
Other diseases of heart (430-434)	262	. 7	125	47. 7	. 6	22	8. 4	. 5
Hypertension with heart disease (440-443)	2, 195	6. 1	1, 344	61. 2	6. 2	184	8. 4	4. 4
Hypertension (444-447)	301	. 8	161	53. 5	. 7	29	9. 6	. 7
General arteriosclerosis (450)	1, 073	3. 0	576	53. 7	2. 7	60	5. 6	1. 4
Other diseases of arteries (451-456)	87	. 2	63	72. 4	. 3	37	42. 5	. 9
Other diseases of circulatory system (460-468)	71	. 2	43	60. 6	. 2	21	29. 6	. 5
Chronic and unspecified nephritis (592-594)	426	1. 2	242	56. 8	1. 1	39	9. 2	. 9
Acute nephritis and nephrosis (590, 591)	48	. 1	41	85. 4	. 2	10	20. 8	. 2
Pneumonia, except pneumonia of newborn (490-493)	705	1. 9	506	71. 8	2. 3	149	21. 1	3. 6
Diseases of digestive system (530-587)	1, 239	3. 4	1, 029	83. 0	4. 8	386	31. 2	9. 2
Hyperplasia of prostate (610)	0	0	0	0	0	0	0	0
Congenital malformations (750-759)	428	1. 2	359	83. 9	1. 7	186	43. 4	4. 5
Certain diseases of early infancy (760-776)	982	2. 7	954	97. 1	4. 4	292	29. 7	7. 0
Senility and ill-defined causes (780-795)	105	. 3	39	37. 1	. 2	10	9. 5	. 2
Accidents, poisonings, and violence (E800-E962)	1, 362	3. 8	866	63. 6	4. 0	214	15. 7	5. 1
Suicide, homicide, etc. (E963-E999)	233	. 6	49	21. 0	. 2	31	13. 3	. 7
Other infective and parasitic (030-139)	142	. 4	120	84. 5	. 6	60	42. 2	1. 4
Neoplasms (206-239)	127	. 4	97	76. 4	. 4	46	36. 2	1. 1
Various diseases of sense organs (335-398)	329	. 9	220	66. 9	1. 0	56	17. 0	1. 3
Influenza and bronchitis (480-483, 500-502)	127	. 4	69	54. 3	. 3	25	19. 7	. 6
All others	947	2. 6	670	70. 7	3. 1	255	26. 9	6. 1

¹ Numbers in parentheses are category numbers of the sixth revision of the International Lists of Diseases and Causes of Death.

the usefulness of cause-of-death data. Presented here are a few suggestions that, it is hoped, local health departments may wish to develop further through demonstration projects. The suggestions apply particularly to collection of data which are to be used for epidemiological studies of the degenerative diseases. Emphasized are steps that might be taken to prevent some of the inaccuracies resulting from the absence of post-mortem data at the time the death certificate is filled out, but attention is also given to the improvement of accuracy through correct recording of available data and to the problem of multiple causes of death.

Obtaining Post-Mortem Data

One possible method of correcting inaccurate cause-of-death statements would be for the pathologist to send a copy of each autopsy summary to the local health department. This practice might be of help in resolving many of the questions posed by the present medical certifications, and it should reduce the number of certificates requiring queries to the attending physician. Many deaths, of course, do not go to autopsy, but the provision of an autopsy summary for those that do should increase the body of trustworthy data.

Another possible approach would be the re-vamping of procedures for correcting medical

Table 7. Hospital and autopsied deaths among males, by age, upstate New York, 1952

Age in years	Total number deaths	Hospital deaths		Hospital autopsied deaths	
		Number	Per-cent of total	Number	Per-cent of total
Total	43, 352	25, 206	58. 1	7, 049	16. 2
Under 1	2, 293	2, 033	88. 7	801	34. 9
1-14	718	404	56. 3	209	29. 1
15-24	585	290	49. 6	134	22. 9
25-34	919	518	56. 4	247	26. 9
35-44	1, 820	1, 021	56. 1	434	23. 8
45-54	4, 379	2, 400	54. 8	872	19. 9
55-64	8, 964	5, 125	57. 2	1, 722	19. 2
65-74	11, 275	6, 333	56. 2	1, 544	13. 7
75-84	9, 265	5, 329	57. 5	899	9. 7
85 and over	3, 134	1, 743	55. 6	187	6. 0

Table 8. Hospital and autopsied deaths among females, by age, upstate New York, 1952

Age in years	Total number deaths	Hospital deaths		Hospital autopsied deaths	
		Number	Per-cent of total	Number	Per-cent of total
Total	36, 198	21, 647	59. 8	4, 174	11. 5
Under 1	1, 611	1, 421	88. 2	520	32. 3
1-14	539	366	67. 9	175	32. 5
15-24	264	163	61. 7	71	26. 9
25-34	645	460	71. 3	207	32. 1
35-44	1, 229	801	65. 2	274	22. 3
45-54	2, 607	1, 655	63. 5	447	17. 1
55-64	5, 256	3, 162	60. 2	696	13. 2
65-74	9, 081	5, 357	59. 0	914	10. 1
75-84	10, 182	5, 736	56. 3	684	6. 7
85 and over	4, 784	2, 524	52. 8	186	3. 9

certifications of the cause of death after the certificate has been filed. Some States, with legal considerations in mind, have made it difficult to make changes in the cause-of-death statement, often requiring the physician to submit special legal forms. As a first step, arrangements might be made for public health administrators to obtain changes, even if the "legal" certification of death remains the same. Physicians and hospital record rooms could be encouraged to submit supplemental unofficial data on deceased patients when such information effects a significant change in the cause of death already recorded. At least one registration area (New York City) is now employing a certificate form in which the medical portion of the record is filed separately from the "legal" portion.

Some improvement in accuracy of medical certification of cause of death can probably be made by increased efforts to educate physicians to evaluate the various pathological factors properly and to communicate their decisions accurately by means of uniform disease terms, as well as to complete the certificate accurately. Local health agencies should renew their interest in these problems. By maintaining alert, medically oriented querying programs, they can insure that physicians correct and adjust the causes of death. The daily sheaf of death certificates passing through the local health

unit should be examined by a person with medical training, one who can select those requiring followup. In addition, arrangements might be made for the health agency to receive routine reports or periodic samplings of post-mortem examinations as a guide in taking steps to correct inaccurate cause-of-death data in those records forming a basis for the agency's programs.

The Problem of Multiple Causes

The present study suggests also the need for changes in the methods of collecting and analyzing mortality data if such data are to be used for epidemiological studies of chronic disease. Even among the patients dying from these chronic diseases who are autopsied, the problem of sorting out a single underlying cause is not simple. In many of these cases, several degenerative processes have been at work, and it is sometimes difficult to attribute death to a single underlying cause. With the present aging of the population and the decrease of communicable disease fatalities, the problem of multiple degenerative processes is increasing proportionately so as to overshadow all of the excellent steps taken so far to improve cause-of-death reporting. This situation is responsible for the third type of inaccuracy in cause-of-death data mentioned above.

If present trends continue, an ever-increasing number of deaths will be attributable to any of several combinations of diabetes, hypertension, pulmonary fibrosis, atherosclerosis, heart disease, obesity, cirrhosis, senility, nephritis, and cerebral hemorrhage. The exact one of these recorded as the primary cause will often be largely a matter of the physicians' opinions of the sequence of the processes. Even pathologists observing end results with all available clinical data at hand can hardly be expected to be consistent and infallible in arranging disease patterns so as to select the underlying cause. Moreover, even if the "true" cause of death were, for example, cerebral hemorrhage, perhaps the only public health control measure available to postpone its occurrence would be an attack against an accompanying hypertension, diabetes, obesity, or nephritis. Public health recognizes that chronic diseases seem more often due to diffuse multiple causes than

to specific ones. The weakest link in the chain of disease, the best potential point for attack, may reside in an attribute rarely or inadequately counted among the pathological conditions associated with fatal illness. Moreover, the present reporting system prevents us from being able to study the total prevalence of certain serious conditions at time of death. An awareness of these facts may be partly the reason for the current emphasis on morbidity instead of mortality surveys in a search for epidemiological factors in chronic disease.

For these reasons, physicians and pathologists might record not only the underlying cause of death on the death certificate, but whatever data are available on the type and duration of each pathological or pathophysiological condition present. A real challenge awaits specific local health units who wish to explore this possibility on a pilot basis. Preliminary studies based upon multiple cause analysis of routinely submitted certificates are interesting. Sagen and Vinyard (5) report that in all diseases except tuberculosis, malignant neoplasms, other diseases of the heart, and accidents, at least 50 percent of the death certificates they reviewed indicate a multiple cause. The diabetes group had the largest proportion, 87 percent, with multiple causes. Such data, however, are not as meaningful as they would be had the reporting physician been instructed to list all pathology which was present, since under current practice it is common to omit listing some conditions in completing a death certificate. The available space for the medical certification is too limited to permit the inclusion of all the many pathological processes which may be involved, a fact which suggests that the certificate might be redesigned or supplemented for special studies in selected areas. Thought might be given to including on the reverse of such death certificates a checklist of the medical conditions which are important to modern public health practice.

Summary

1. Autopsy protocols for 1,889 consecutive deaths occurring during 1951 and 1952 in 12 hospitals in the area of Albany, N. Y., were reviewed, and new death certificates were prepared from the autopsy information. These

certificates were coded and compared with the original certificates on file in the New York State Department of Health.

2. When causes of death given on the original certificates were matched with the "true" cause as determined at autopsy, the errors in the original certificates were often found to be compensating. Despite such a compensating effect, the extent of the error in a large number of specific cases raises serious doubts as to the validity of the use of cause-of-death data as a basis for epidemiological studies of degenerative diseases.

3. Certain of the degenerative diseases which figure importantly as causes of death, such as arteriosclerotic heart disease, diabetes, and vascular diseases of the central nervous system, are decidedly underrepresented among the deaths autopsied. For these causes, the percentage agreement between the original death certificate and the autopsy certificate was 72.8, 30.6, and 59.5, respectively. The fact that a large number of such deaths do not occur in hospitals suggests that even greater errors exist in the present mortality data for these conditions.

4. Suggestions made for improving the accuracy of cause-of-death data include more querying of physicians, submission of autopsy summaries to local health departments, encouraging physicians to report additional data after the death certificate has been filed, redesign of the death certificate, and analysis of multiple causes of death after physicians have been instructed to report all of the pathological conditions present at time of death.

5. Programs for improving the accuracy of cause-of-death data should be developed through local demonstration projects in order to improve the practicability and usefulness of the resulting data for epidemiological studies in the degenerative diseases.

ACKNOWLEDGMENT

The assistance of Harri Janssen, John P. Leonard, and John V. Skiff, junior public health interns in the New York State Department of Health, and of the staffs of the local health department and hospitals in the Albany region in carrying out this study is acknowledged.

REFERENCES

- (1) Swartout, H. O., and Webster, R. G.: To what degree are mortality statistics dependable? *Am. J. Pub. Health* 30: 811-815 (1940).
- (2) Dunn, H. L.: What is the role of the health officer in improving cause-of-death statistics? Presented at the New York State Annual Health Conference, 49th, Lake Placid, N. Y., June 2, 1953.
- (3) Pohlen, K., and Emerson, J.: Errors in clinical statements of cause of death. *Am. J. Pub. Health* 32: 251-260 (1942).
- (4) Korn, R. F., and Lintz, W. B.: Death certificate-autopsy non-correlations study, 1949. Unpublished material of the New York State Department of Health.
- (5) Sagen, O. K., and Vinyard, J. N.: Preliminary report on the tabulation and analysis of deaths due to multiple causes. Report of the Working Committee on Mortality Statistics, Fourth Annual Meeting of the Public Health Conference on Records and Statistics, March 1952. Washington, D. C., The Committee, 1952.

PHR

An official of the Foreign Operations Administration discusses some of the broad considerations which underlie the United States technical cooperation programs as they relate to the health problems in the underdeveloped areas of the world.

Health in Foreign Operations

By JOHN H. STAMBAUGH

THROUGH the Foreign Operations Administration, the United States is working with about 60 other nations to build the mutual security of the free world. We are doing this through joint defense undertakings, through increasing economic strength, and through the sharing of modern techniques.

Under the mutual security program, the defenses of the free nations are growing; the North Atlantic Treaty Organization is now a strong deterrent to Communist aggression in Western Europe. By 1953, NATO had increased the number of its active divisions three-fold over 1951 and had more than doubled its aircraft strength. In 1953, the free world's economic strength reached its highest point since the end of World War II.

The United States is cooperating with the peoples of the less developed areas of the world to help build their technical knowledge and skills, with primary emphasis on projects in health, agriculture, and education. Under

President Eisenhower, this cooperation has been increased. More United States technicians are serving abroad than ever before.

Long before the United States Government, through the Institute of Inter-American Affairs and later through the Act for International Development, entered this field of sharing technical knowledge, many private organizations and institutions of the United States were actively working with the people of other countries. Voluntary agencies, foundations, colleges, commercial firms, and church groups were—and still are—carrying out a host of projects abroad. Their work has been notable, especially in the field of health. Through the medical missionary, for example, several thousand dispensaries and hundreds of hospitals have been set up and are daily helping the people of other countries.

The technical cooperation programs of the Foreign Operations Administration, however, are carried out in a different way from the programs of private groups. A church mission may maintain a hospital; a foundation may conduct essential research; an American business firm may provide health care for its employees from the surrounding area in a foreign country. But by their very nature these projects must operate in limited areas. The scope of FOA activity is much broader. This agency works with the governments of the host countries on programs which will eventually result

Mr. Stambaugh is assistant to the director of the Foreign Operations Administration. Presented here are excerpts from his address before the Midwest Conference on World Health, held in Chicago, June 10-11, 1954. The conference was sponsored by the National Citizens Committee for the World Health Organization.

in provision of nationwide governmental service in health and other fields.

In every instance, the United States enters into these cooperative programs only upon request from the individual countries. The initiative for the programs is theirs, not ours: We seek only to help the people to help themselves. Complete responsibility for projects is assumed by the host countries as rapidly as possible. It is important to keep in mind that, while the United States is contributing financially to these joint programs and is sending technicians to help plan and carry them out, the host countries are contributing more than we are, not only in funds but also in personnel and in facilities. Money contributions by the host country, as a matter of fact, average about double the United States' contributions, and in some programs, host-country contributions exceed ours many times—27 times in the health program in Brazil, for instance.

In some of the less developed countries, funds for economic development are made available in addition to technical cooperation. Frequently, these funds supplement technical cooperation by providing supplies and commodities needed to undertake projects or speed up those already undertaken. Where the funds are applied, they permit an increase in the tempo of technical projects.

Guiding principles in the cooperative programs have grown as the programs themselves have developed. In the early days of the health programs in various countries, for instance, matters of immediate emergency were tackled first. The widespread devastating diseases, such as malaria, were attacked on a wide scale. But, as the work proceeded, increasing importance was attached to the development of national health programs to service local areas so that the people themselves could continue to carry on the health work.

Training and Health Education

The United States has given continued attention to the training of local personnel in the techniques and skills necessary to maintain and expand the work once it is under way. This is true for every field of technical cooperation.

Local health workers are trained to the max-

imum extent possible within the country itself, and, in addition, participants in the health programs are brought to the United States for study and for observation of our techniques. Under the Foreign Operations Administration and its predecessor agencies, more than 2,300 technicians in health have received training in the United States. Most of these have returned to take influential positions in their own countries and to help train others in carrying on the programs.

Hand in hand with training has gone the need to acquaint the public of the host country with the programs. In health programs, this has meant developing the acceptance of health practices on the part of the people. It has meant providing health education through every avenue possible, through audiovisual and other information programs, and in conjunction with agriculture and education cooperative programs.

Audiovisual media sometimes do a strikingly good job in informing people about proper health procedures. In one country in the Middle East, during the showing of a film on the care of babies, a husband strode over to his wife and began to belabor her for not having already used the method of baby care which was being shown on the screen.

In another country, in an isolated village, health technicians were surprised to discover one woman—just one—who was taking care of her baby in the manner prescribed by the health team. Inquiry disclosed that her husband had recently been to another village, had seen a film on baby care, and had gone back to see it five times until he had memorized all the procedures so that he could explain them to his wife.

Joint Planning

The Foreign Operations Administration has learned the importance of integrating the different cooperative programs within each country, of relating health projects to agriculture, agriculture projects to health, and so on. Joint staff meetings of the technicians in the different programs in the field have proved beneficial.

In planning one irrigation project, for instance, it was necessary to see that malaria-

bearing mosquitoes did not breed in the canal waters. It was necessary also to use means for the control of snails which are host to a debilitating disease that attacks humans. Joint planning also permits the closer adjustment of crops to nutritional requirements.

The close relationship between health and education projects is obvious, and, particularly in rural areas, health rules become a primary part of basic education.

The development of joint planning has another benefit. It sets a useful pattern for host countries to follow in the long-range handling of their programs after the United States technicians depart.

Coordination With Other Agencies

In all of its technical cooperation activities, the Foreign Operations Administration endeavors to coordinate its programs with those of the United Nations, the Organization of American States, and other agencies in the field. This close relationship is illustrated by the fact that Dr. John J. Hanlon, chief of the Public Health Division of the Foreign Operations Administration, was a member of the United States delegation to the World Health Assembly at Geneva in May 1954.

Although cooperative projects normally are arranged between the host country and the Foreign Operations Administration, in some instances they include a third party. In Ethiopia, the World Health Organization, for example, works with the Foreign Operations Administration and the Ethiopian Government in a health center organized under the Ethiopian Ministry of Health.

In some countries, in campaigns against diseases, the World Health Organization pays particular attention to control of tuberculosis and venereal disease; consequently, either the Foreign Operations Administration's health programs include fewer projects to combat these diseases or FOA attempts to coordinate possible contributions and activities in these fields with those of WHO.

Coordination of projects applies in all fields. A celebrated example is that of the combined efforts to meet the menace of the desert locust in the Middle East. American, British, and

United Nations workers collaborated with the various governments of the area in dusting by airplane and carrying out other means of combating the pest.

Importance of Health Projects

Health projects are among the first in importance in helping the nations of the underdeveloped areas to strengthen their economies and improve the lives of their people. Strong, able bodies can better open the way to a successful attack on the other problems of a national economy.

Most of the people in the less developed countries make their living from the land. In countries where the people suffer from malaria, they lack the energy to produce in abundance even with improved techniques. Good food may be essential to good health but, on the other hand, good health is a prime requisite in the improvement of agriculture.

The severe drain of disease upon the constructive potential of a nation can be readily dramatized by a few figures. It was estimated a few years ago, for instance, that an annual number of 100,000,000 cases of malaria in India meant that about 9 billion man-days of labor were lost each year. If the inroads made by disease upon productive energies of peoples in the less developed countries of the free world each year were totaled, the figures would be astronomical and almost beyond comprehension.

The conquering of major endemic diseases in these areas thus has its vital economic aspect, as well as a strong humanitarian appeal. It makes better workers of the people and permits them to become more self-sufficient. It also makes of them an increasingly better market in the commerce among nations. They become additions to rather than a loss from world production and trade, and they strengthen the economies of their own nations.

Health projects were among the first begun under our technical cooperation programs. They have reached scores of millions of people all over the world. In Latin America alone, where the work got an early start, more than 20 million persons have directly benefited.

The programs have included measures to solve environmental problems—sanitation, water supply, sewage disposal, and control of insects. They have included the development of health centers, nursing schools, and hospitals. These activities are mentioned to indicate the many different kinds of specialists needed in the field of health. At present, the United States foreign health programs could use at least 100 additional specialists.

The Long-Term Goal

There are both an immediate and a long-term objective in these cooperative programs. The United States wants to help overcome the great scourges that afflict these people, but it wants also to help them establish services for the continued control of disease and for maintaining improved health standards on a permanent basis. These programs help, not only in meeting immediate needs, but also in building the mutual security of the free world.

To achieve the long-term goal, the Foreign Operations Administration is gearing its cooperative efforts to the overall economic development of the host countries. By so doing, the host countries are better able to continue the operations under their own supervision and financing when the techniques have been adequately demonstrated. More and more projects in health, agriculture, education, and other fields are being integrated into balanced programs, with the long-term goal in mind. By experience, it has been learned that although there may be excellent programs in each of these fields, they are not fully effective in helping the host country toward its broad objectives unless they are carefully coordinated.

Nationwide social and economic development cannot take place simply on the basis of functional segments thrown together into a conglomeration of disparate projects, no matter how worthy the purpose of any single project nor how well any one project may be managed. Human and material resources are so closely related to a nation's economic growth and political future that development of all these resources must be integrated as wisely as human knowledge and ability can manage.

If technical skills are to be shared and developed, there must be education.

If knowledge is to be used to build industry, there must be the capacity to produce.

If production is to take place, the workers must have vigor.

Vigor depends upon proteins.

Proteins become available through the efforts of healthy and productive farmers and fishermen.

Education—industry—health—agriculture—each of these separate fields is in itself worthy. Work in each field, however, becomes most effective when geared to operations in all other fields.

One program in which the various factors involved in economic development are given consideration is the area development plan now under way in three provinces around the city of Concepción, Chile. This program permits the concentration of available personnel and funds on a single endeavor rather than spreading them countrywide. Serving as a demonstration activity it provides a base on which other regional developments can be planned.

Another regional program, now operated by the government of the host country, was developed in the Amazon basin of Peru. It includes 6 hospitals, 2 health centers, 4 dispensaries, and a number of motor launches to carry health personnel to outlying districts.

Emergency Food Operations

Closely related to health projects are the emergency food operations of the Foreign Operations Administration. When an economic emergency arose in Bolivia in the fall of 1953, President Eisenhower took action to authorize the sending of \$5 million in surplus agricultural commodities to help meet the food deficit of the country, and another \$3 million was authorized in March 1954.

Emergency wheat shipments to Pakistan were begun in 1953 to counter the threat of famine in the wake of severe droughts. More than 600,000 tons of wheat had been shipped by late April 1954, when the Pakistan Government announced that the crisis had been met. The Pakistan Government reported that the shipments had saved millions of lives.

During the summer and fall of 1953, more than 5½ million food packages were provided for persons in the Soviet Zone of Germany and East Berlin. Nearly a million East Germans crossed the lines into West Berlin to pick up the food. About 4½ million food parcels were distributed in 1953 in Spain, Italy, Austria, West Germany, and Greece, and in many Middle Eastern and South American countries.

These emergency operations, like the health programs, are an essential part of the United States' effort to build strength and stability throughout the free world.

Toward Peace and Progress

All the programs of the Foreign Operations Administration—whether for the sharing of modern techniques, for increasing economic strength, or for joint defense against aggression—combine to help build toward world peace and progress. Our goals are worthy, our methods are honorable and open, our offer of partnership is firm. The United States wants to help other nations to develop their own resources for the good of their peoples and to strengthen their own security and independence. In their strength, we ourselves are strengthened.

Tenth National Conference on Rural Health

The 10th National Conference on Rural Health, sponsored by the Council on Rural Health of the American Medical Association, will be held February 24-26, 1955, in Milwaukee, Wis. Introducing the theme of the conference, "Looking Both Ways," will be an address by Dr. F. S. Crockett, chairman of the Council on Rural Health. Physicians and farm and community leaders will participate in the 3-day program, which is centered around several broad topics: farm and home safety, recreation, family responsibility for health, use of present health and medical care resources, and rural health and world peace.

School Health Education in Dearborn

—A Growing Program—

By FRANK H. JENNE, M.P.H.

FOUR YEARS AGO the school health program in Dearborn, Mich., was primarily service-centered. Since then it has become education-centered, and it continues to grow in that direction.

The same general division of functions between the school and city health departments that existed in 1950 before a study was made is maintained today, except that the schools have vacated the treatment field. Each department has its own nursing staff. The school nurses are responsible for health education and health counseling in the schools, and for followup on school screening programs. The city is responsible for communicable disease control. The city health department provides environmental health service to the schools. It also serves as a channel for the school health department to the specialized services of the State health department. The entire relationship is maintained by frequent conferences between the directors of the two departments and through the Dearborn Community Health Council and the School Health Advisory Council.

Mr. Jenne has been director of school health in the Dearborn (Mich.) Public Schools since 1953. He is also secretary of the Dearborn Community Health Council and a member of the Michigan School Health Association Board of Directors. Before coming to Michigan he was assistant secretary of the Cincinnati Public Health Federation.

In recent years the Dearborn Community Health Council has been making a determined effort to strengthen the city health department's staff and facilities. An advisory public health commission has been established as a result of this activity and several new city nursing positions have been created. The health council's eventual goals include a laboratory, health educator, and a suitable health center for the city department, and a board of health with legal authority.

It was in 1950 that the School Health Advisory Council of Dearborn, including the board of education, school staff members, and parent and community representatives, studied the old program with a group of consultants from the University of Michigan School of Public Health. The study laid for the schools this philosophical footing for the new approach:

"The modern concept of education requires that we accept responsibility for the development of the whole child. Certainly, then, this includes the physical well-being of all children. Since we are an educational institution, our health program should be aimed primarily toward (a) providing that health knowledge which will result in desirable health attitudes and behavior, (b) providing a proper foundation for intelligent choices on the part of the individual so far as his own personal health is concerned, (c) discovering physical defects, and (d) exerting every effort to see that the remediable defects are corrected.

"The school is expected to assume responsi-

bility for the health instructional program and the development of desirable health attitudes and behavior. The school, cooperatively with the parents and family physician and dentist, is responsible also for the detection of physical defects.

"In the matter of treatment, however, it is the policy of the Dearborn city school district that this should be left to the family physician and dentist always keeping in mind that there will be a fringe of medically indigent families for whom treatment assistance must be secured."

The school health department's activity programs—roundup, screening, health appraisal, and topical fluoride—rest solidly on this footing as educational projects. Conversely, the health education program is largely one of activities. Parent as well as pupil participation results in carryover to the home, community support for the program, and material assistance in reducing the workload of the school nurses and teachers. Description of various phases of school health in Dearborn in light of these concepts will indicate the present status in the growth of the program.

Kindergarten Roundup

Roundups are held in the spring for pupils entering kindergarten in the fall and in the first semester for those entering in the second semester. The most successful programs from the standpoint of attendance are those to which parents receive a personal invitation from a parent worker. In one school in a growing neighborhood parent block workers ring doorbells of newly occupied homes and in this way obtain the attendance of parents not known through the school census. Often, this call represents the first contact in a new community and results in the recruitment of new parent-teacher organization members before they become involved in other social or civic activities.

The most successful roundups from the standpoint of program are those that are planned by the building roundup committee with guidance from the principal and nurse, and at which the parent roundup chairman, rather than the principal, presides.

The purpose of the roundup is to provide a happy introduction to all phases of the school

program and to assist parents in preparing children for school. The principal, school nurse, visiting teacher (who is a trained social caseworker), and kindergarten teacher each has a part in the program. The nurse distributes and explains the personal health history form to be filled out by the parent and the health appraisal forms to be filled out by the family physician and dentist. She provides some general information about school health policies and the health needs of the school child. The social hour following the program gives her an opportunity to answer some personal questions and begin to get acquainted with the new parents.

Later, when the mother comes for her enrollment interview with the teacher, she has a "get-acquainted" interview with the school nurse or with the city health department district nurse who conducts the interviews in one building while the school nurse is busy in another. In the interview the nurse may obtain pertinent health information about the child which the parent or physicians have neglected to mention on the health form. She may also find parents who have neglected to have a health appraisal done and encourage them to do so. She may steer them to a community facility such as the city physician if that is indicated.

In this way, 95 percent of the entering kindergarteners had medical health appraisals in 1953-54. Ninety-three percent had complete immunizations. Eighty percent had a dental health appraisal, and 23 percent had topical fluoride applications before coming to school.

The number of fluoride applications approximately doubled, as a result of the city health department's 1953 summer fluoride program for preschool children. The school health department loaned its equipment and helped plan the project. Stations were set up in schools. Unfortunately, the program was not continued in 1954. It may be possible to give the service again in 1955 and enlist the support of the schools' parent health workers in increasing participation.

Screening: Vision and Hearing

The first activity after kindergarten interviews in the fall is vision screening. This is

carried out by the teachers with parent help under the guidance of the nurse. Units in eye health are taught and include such pupil activities as children measuring the light on their desks and preparing posters on eye health. The screening method used is the Snellen "E" chart with plus sphere lenses. Rechecks are made by the nurse before referral. The procedure was worked out with the help of the Michigan State Department of Health consultant and local ophthalmologists. Vision screening is scheduled for the junior primary through grade 6, and again in grades 8 and 10 and the first year of college. In college, the vision screening tests are carried out by a student committee with the guidance of the nurse.

Hearing screening follows much the same organizational and educational pattern as vision screening, except that it is performed by an audiometrist. Pamphlet materials and guides to visual aids for teacher use provided by the State health department are distributed by the nurse to teachers in grades 3, 6, 9, and 12 before the screening begins.

Sodium Fluoride Applications

Preparation for the sodium fluoride program begins with a building committee which may include the teachers, student representatives, parents, the principal, and the nurse. It is the committee's job not only to sell the program to parents and children but also to set up activities that will result in improved dental health practices.

Pupils make posters advertising the fluoride program and display them in the building. The program is often explained to parents at meetings as well as through letters. Second graders write and produce puppet shows and give toothbrushing demonstrations with the large tooth-and-brush models at meetings attended by their parents. After the show, tasty and attractive but healthful refreshments are served. The dental hygienist may be invited in to help a grade 5 class with its project. Eighth graders may collect specimens for lactobacillus counts and send them to the Michigan Department of Health laboratory. In general, the activities of the younger pupils are at the level of drama and imitation, and such children de-



Figure 1. "Mother" brings "child" to "family doctor" for a health appraisal.

light in the mastery of the process of toothbrushing. Older pupils are more interested in the technical and scientific aspects of dental health.

The topical fluoride program has become well known to many parents since its beginning in 1950. Several parent groups have therefore held programs on water fluoridation with speakers supplied by the local dental society.

Slightly more than 90 percent of the pupils in the eligible grades accept the fluoride applications. Eighth grade pupils sign the request form themselves, in addition to obtaining their parents' signatures. This gives them a chance to exercise some responsibility for their own health. The school nurse refers indigent children to the city health department dental clinic for needed care.

Health Appraisal

One of the specific objectives of Dearborn's health education program is to establish the attitude that periodic medical and dental check-ups are an important part of healthful living. After the first health appraisal upon entering kindergarten—or the school system for the first time—additional examinations by the family doctor and dentist are asked for in grades 3, 7, and 10, and the first year of college.

Educational preparation for this event at the lower grades includes the use of visual aids, the nurse or a neighborhood physician as a resource person, and role-playing, by the pupils, of examination procedures (fig. 1). At the high

school level, students prepare and present panel discussions on health appraisal in their English classes. In junior high school, an instructional unit is given by the physical education teacher. This unit seeks first to motivate the student to have an appraisal. It also discusses the physician-patient relationship, the problem of selecting a physician, and quackery. Correlated activities are also carried out by the art, science, homemaking, and "block of time" (English and social studies) teachers.

Orientation programs for pupils entering high school (grade 10) and their parents were developed this past year. They follow to some extent the objectives and pattern of the kindergarten roundup. This activity gives the nurse an opportunity to explain the health appraisal to parents who are no longer active in parent-teacher associations and other school activities. In fact, the orientation programs resulted in considerable parent interest in developing increased parent participation at the secondary level.

The health appraisal program recognizes the fact that junior and senior high school students take increased responsibility for their own health care and that the college freshman is almost solely responsible. In practice, medical appraisals are obtained by 60 to 75 percent of the pupils in grades 3 and 7. This jumps to 97 percent in grade 10 and 90 percent in first year of college. Thirty to forty percent have dental appraisals. One reason for the high 10th grade participation is the reluctance of physical education teachers to permit strenuous activity without the protection of a health appraisal report.

The health appraisal includes a personal health history filled out by the pupil and his parent. Instead of a checklist of procedures, the physician's portion of the form contains questions designed to reveal conditions of which the school should be aware and to bring out specific recommendations for necessary modification of the child's school activities.

Health appraisals for indigent children are regarded as a community rather than a school responsibility. It is the nurse's job to see that school children from indigent families are introduced to the community health resources they need.

Educational Activities

A statement "What Do You Believe About Health Education?" was developed by the school health department staff and instruction personnel (see p. 61). The statement was designed to crystallize a school health philosophy in Dearborn. How this philosophy is carried out varies from year to year and from school to school because of the concept of student-staff planning.

At one building, for example, students must cross a major highway to reach their play area. Despite heavy truck traffic there is no stop light. To reinforce their demand for action, students counted the number of cars and trucks passing the school—some 800 per hour. Staff, parents, and pupils worked on the problem, which was complicated by a question of which of several government units was responsible. Once this problem is solved, attention will be turned to others which can provide worthwhile learning experiences and achieve worthwhile objectives.

In other schools an inadequate breakfast at home is a perennial problem. This is something that requires home-student cooperation. Fourth grade youngsters almost traditionally tackle this problem by putting on a breakfast or luncheon in the school lunchroom for their parents (fig. 2). Usually the menu includes several choices to demonstrate different kinds of good breakfasts. A skit, written and presented by the children, dramatizes the kind of breakfasts they would like to have each day,



Figure 2. Parents join children in eating a "good" school lunch.

Statement on School Health Education

Do You Believe that . . .

- ▶ health education is a continuous experience in healthful living throughout the entire day?
- ▶ health education is a part of every phase of the student's experience in school and out, but improvement of living at school should be our first concern?
- ▶ health instruction should make the maximum use of the health implications inherent in all subject areas?
- ▶ health instruction should recognize personal and group problems of health and actually come to grips with the problems?
- ▶ health instruction should build upon and reinforce the health understandings, habits, and attitudes developed in preceding grades?
- ▶ the health status of students should be given consideration when determining the type of educational program in which they will participate?

- ▶ to establish effective health habits, attitudes, and practices the school must provide a healthful environment?
- ▶ health instruction is an integral part of all of the student's experiences?
- ▶ health instruction is the responsibility of every member of the total staff?
- ▶ health education should result in healthful living, and that correction of defects and mastery of health facts do not necessarily insure healthful living?
- ▶ health instruction extends beyond the course of study and the coverage of material in a basic text?
- ▶ the health program can best be evaluated in terms of behavioral changes?
- ▶ improved behavior is more certain to result when health instruction has been given through the problem-solving approach where students and staff plan and work together?

including some pointed bits of business about the conduct of adults at the breakfast table.

Other schools have tackled the first aid problem. The usual result is a first aid kit and manual written by and for each school and each room. This activity has perhaps helped as much as anything else to establish the school nurse as the school health consultant rather than a finger-wrapper.

The bicycle safety situation became a real problem in one school, especially with conflicting advice from parents and teachers about street versus sidewalk riding and left-side-of-the-street versus right. Parents, staff, and children met with a policeman and other safety experts and wrote their own bike-safety manual. This mimeographed pamphlet got the message across much more effectively than an expensively printed manual prepared by experts could have done because it was written by those who use it.

Halloween treats of candy—often sticky, unwrapped, and insanitary—got the attention of one school. The result: an attractive leaflet, written and illustrated by the children, listing the kinds of treats they would like to have.

These are but a few examples of the kinds of

health education activities in Dearborn schools. Some of them are classroom activities. Others are sponsored by health and safety committees of the student councils. All of them require planning that involves students, teachers, and the nurse and may also involve parents and representatives of community agencies.

The Basic Text

At first the concept of health education as extending "beyond the course of study and the coverage of material in a basic text" was interpreted as the "beyond" only without "a basic text." Of late, as teachers have seen health instruction needs that remain unmet and as they have seen some of the excellent new texts available, an increasing number of requests for text books have come to the director's office.

During 1952-53, the system's elementary health curriculum committee developed screening criteria to be applied to the several health text series available. One of these criteria calls for a text that will stimulate activities of the sort described in this paper and will not substitute for them a simple reading program. Following the preliminary screening, classroom

pilot studies were made in 1953-54 to determine which series will finally be adopted for use. Carefully screened audiovisual aids and other materials are already available to teachers for enrichment of health teaching and include free materials suggested and furnished by the city health department.

In 1951 a committee was appointed to prepare an improved junior high school health and physical education curriculum. A handbook was prepared and texts selected after 2 years of work and study in which consultants from outside the system participated. Now, after 1 year of use, teachers and principals have submitted their comments on the strengths and weaknesses of the course. Their suggestions are being reviewed by the committee and recommendations for further improvement will be made.

Basically, the junior high school course involves a third of each semester devoted to health classes offered by the physical education instructor best qualified to teach health, with the remainder of the time spent in the gymnasium, pool, or on the playground. These classes include units on physical health and safety, first aid, and personality. Additional units, appropriate to the content of the course in which they are placed, are offered in "block of time" (English and social studies), general science, home-making, and industrial arts.

Work on a senior high school health curriculum has just begun as part of a systemwide overhauling of the secondary curriculum. Students have been polled informally as to their interests and needs. Courses of study from other systems have been reviewed, and a list of specific objectives is in preparation. Each high school now has an active future nurses club of which the school nurse is faculty sponsor. Some excellent health teaching is going on but on a "hit or miss" basis.

The new curriculum will emphasize preparation for family and community responsibilities. Instructional responsibility will be shared by the various departments. Teachers will work, not from a set course of study, but from a resource guide which will suggest several alternative methods and list a variety of available resources for use in achieving each objective.

Staff Organization

The school nurse is the sparkplug of the health education and activity program within each school. The 15 nurses employed by the board of education serve 29 public schools, the junior college, and 8 parochial schools. The parochial schools are served on the same basis as the public schools, but lack the advantage of well-organized parent groups. Each nurse serves from 1,500 to 2,200 children in from 1 to 3 schools. A bachelor's degree is required for employment. The staff is remarkably stable. It has a history of only one or two resignations a year.

The successful school nurse in Dearborn shares the leadership of the health program in her school. She has active committees at work on real health problems—yet she knows better than to organize a committee just because one is suggested in the Handbook for Parent Health Workers. She has an infectious enthusiasm for her job that enables her to pile hours of work on busy principals, engineers, parents, teachers, and children and make them love it. She devotes her noon hours to informal conferences with her teachers, for her conception of a "consultant's" job is "to consult" rather than "to be consulted." She works closely with the visiting teacher and counselor, for she is conscious of the mental health implications of her work. She devotes many evenings to committee and staff meetings.

The 8 city health department nurses and their supervisor hold occasional joint meetings with the school health staff. The school and public health nurses serving the same family are encouraged to consult each other directly rather than through interdepartmental channels.

Besides the nurses, the schools employ three dental hygienists, a dentist who gives professional supervision to the fluoride program as required by law, an audiometrist, and the director.

The city health department's sanitarians make frequent inspections of the schools, with special attention to the food service and swimming pool areas. The director of school health analyzes accident reports to find correctable safety hazards.

There is no school physician. Medical advice

is provided as needed by the president of the Dearborn Medical Society, the city health officer, and the city physician.

These physicians, together with the system-wide parent health chairman and representatives of the Dearborn Dental Society, members of the board of education, teachers, principals, school administrative officers, and parochial school, school nursing, and community agencies sit on the School Health Advisory Council, which meets once a month to consider citywide school health problems.

Dearborn also has a well-organized and active community health council in which both school and city health department staffs participate.

Health and physical education policies were last revised and published in 1951. These are interpreted for the staff in the School Nursing Manual, a looseleaf publication that is under constant revision by the staff and the director. In addition, bulletins covering each phase of the systemwide program are issued each year at appropriate times through the offices of the assistant superintendents.

The school health department has a consulting and advisory, or staff, function. Line authority begins with the superintendent and extends down through the classroom teacher.

Policies are developed cooperatively by the line and staff organizations and placed in effect by the line.

For example, a parent and a nurse called the attention of the director to flaws in the system of notifying parents when cases of communicable disease occur in the classroom. The problem was discussed by the School Health Advisory Council, and a committee including a principal, nurse, parent, the city health officer, a representative of the medical society, and the director of school health drew up a recommended procedure including several form letters of an informational nature to be sent to parents. The recommendation was reviewed and approved—first, by the council; then, by the superintendent and his staff, who sent out a bulletin placing the new procedure in effect.

Under this plan of operation each group concerned has a voice in the development of policy, but the authority for implementing policy remains with the line. Much confusion is thus avoided.

The devotion of the health staff and the active cooperation of the board, the administration, parents, and teachers, rather than the pattern of operation, make it possible for Dearborn's school health program to grow and flourish.

Venereal Disease Postgraduate Course

The 23d venereal disease postgraduate course will be given at Tulane Medical School from January 31 through February 4, 1955, under the cosponsorship of the division of graduate medicine and the Public Health Service. The 1-week course accredited by the American Academy of General Practice covers the latest developments in diagnosis, treatment, and management of the venereal diseases and is open to all physicians. Application for enrollment should be sent to Dr. Clifford Grulee, Jr., director of the Division of Graduate Medicine, Tulane University of Louisiana, 1430 Tulane Avenue, New Orleans, La.

research progress report

In reporting the progress of hypertension research assisted by research grants of the Public Health Service, Dr. William H. Stewart prepared for the National Advisory Heart Council, and for limited distribution, a detailed and documented account describing these studies and their relation to the origin, process, and treatment of hypertension. This brief

summary of the investigations was drawn from Dr. Stewart's original report.

At the time of documenting the studies, Dr. Stewart was with the Grants and Training Branch, National Heart Institute. He is presently chief of the Heart Disease Control Program, Division of Special Health Services.

High Blood Pressure

IN THE PAST 5 years, approximately 2.5 million dollars from National Heart Institute appropriations has been granted for 30 research projects on high blood pressure and related fields. About 2 million dollars of this amount is employed by 21 still active projects.

The work pursued by these investigations has been a major influence in (a) encouraging additional extensive and intensive study in what was 5 years ago a peculiarly neglected field; (b) helping to bring about a change of attitude from one of near-hopelessness to one of optimism that hypertension can be managed; and (c) developing better treatment for more patients.

Investigators working on the problems of hypertension are pursuing many avenues in their research, motivated by certain general concepts. The following comments offer a crude frame into which to fit the pattern of NHI-supported research in this field as one element in the total picture.

High blood pressure, or hypertension, is the result of a disease—possibly systemic—directly affecting the blood vessels, from which the heart may ultimately suffer.

Arterial high blood pressure can be caused by or associated with a variety of disorders, but the full causes of essential hypertension, which constitutes the bulk of cases, are unknown. This type of high blood pressure is defined by

many investigators as a persistent abnormal elevation of diastolic blood pressure (the blood measure while the heart is filling) secondary to increased resistance in the peripheral vascular system—the body's bed of small and minute arterial vessels. Since it is generally believed that the abnormal elevation of diastolic blood pressure represents an effect instead of a cause, the core of the problem is the mechanism of increased peripheral resistance.

The following facts illustrate the importance of high blood pressure:

Thirteen percent of the deaths from cardiovascular disease in the United States are definitely due to high blood pressure. Many more deaths which cannot be strictly classified are attributable to hypertensive causes. An additional 30 percent of heart disease deaths cannot be accurately classified as due to arteriosclerosis or hypertension, respectively, but they are due to one of the two, or both.

Of the estimated 10 million persons with some form of cardiovascular disease, fully 4,600,000 have high blood pressure. Of the young men examined by Selective Service during the years 1940-44, 165,000 were rejected because of high blood pressure.

Hypertension is far more common in women than in men, by a ratio of about 2 to 1. On the other hand, hypertension is less frequently fatal for women.

High blood pressure causes a progressively increasing amount of disability after middle life.

The majority of the research grants projects have been aimed toward finding the process by which the peripheral resistance is increased or toward finding a means of nullifying the increased peripheral resistance as therapy for this disease. Currently, several possible processes are under investigation. The studies can be classified roughly as therapy of hypertension, experimental hypertension, and clinical hypertension.

Therapy of Hypertension

Studies supported by the National Heart Institute on the therapy of hypertension chiefly have examined three general techniques: drugs, surgery, and diet.

An increasing variety of both new and old drugs has been under study in the past 4 or 5 years. The rapidly increasing use of some of these drugs by physicians reflects the progress of the research which found the drugs, screened and tested them, and developed their clinical use.

In view of the fact that as recently as 5 years ago there were no drugs especially satisfactory for treatment of hypertension, it is not surprising that the ideal agent has not yet been found. It is even too early to determine fully the benefits from drugs presently in use. High blood pressure is in many cases a 20-year to 25-year disease. The newer drugs, such as the Rauwolfias, have been in use less than 5 years. It can be said that many patients have been greatly helped, symptoms relieved, and useful living restored for some length of time. But a drug is not yet available which affects only the mechanism causing an elevated blood pressure, which remains effective for a long time in a given dose, and which has no bad side effects or reactions.

Surgical and dietary therapies are being improved and are continuing to be used, though perhaps not as much as in the past. At no time, however, has surgery been employed as extensively as diet therapy, which continues to be useful.

Contemporary surgical treatment consists of removal of a diseased kidney suspected of being

the cause of hypertension, removal of an endocrine tumor, correction of coarctation of the aorta, or sympathectomy. Sympathectomies—operations on the sympathetic nerves designed to reduce blood pressure—are of two types: the total sympathectomy, which aims to remove functionally as many sympathetic ganglia as feasible (those nerves adjacent to the spinal column which are linked to and control the diameter of blood vessels), and partial sympathectomy, which restricts the surgery to specific nerve areas. Each denervation differs in procedure, area, and response.

Diet therapy usually falls into 1 of 5 groups: (a) low salt diets, (b) low protein diets, (c) low cholesterol diet, (d) low caloric diet, (e) rice diet.

Experimental Hypertension

The study of any disease is greatly facilitated if the disorder can be produced easily in experimental animals and then manipulated more or less at will. Consequently, much work is done in experimental hypertension, the production and study of this disorder in animals. This work includes studies of the factors which will modify the "experimental" disease once it has been produced and studies of its origin and development in experimental hypertension caused by kidney damage. Much attention is concentrated on the role of the sodium ion and on the activity of renin, an enzyme produced by the kidney. The sodium ion appears to have a central position in the genesis of vascular lesions.

In summary, studies have demonstrated that, by certain manipulations of the kidneys, hypertension in animals can be produced with a fair degree of predictability. Examples of such manipulation include wrapping the kidney with silk, administration of drugs or hormones, introducing infectious organisms, or substituting saturated salt solutions for drinking water. Although reports indicate considerable progress, the exact organic action of the kidney in this experimental animal hypertension is still undetermined.

Extensive investigation of the exact role of the secretions of internal glands in the production of hypertension and their relationship to

other mechanisms also have been productive of much useful knowledge, although it is not as yet decisive.

In particular, research has directed attention to secretions of the adrenal cortex and an anterior pituitary preparation. Removal of the adrenal glands had a striking effect on hypertension in nephritic rats injected with cortisone, if they were well nourished.

Grant-supported investigations of the role of nervous and psychological mechanisms in the origin and development of experimental hypertension have been directed mainly to human subjects because investigations of these stresses in experimental animals have yielded too little useful information. Even in man such studies are extremely difficult because they are affected by a multitude of variable factors. Nevertheless the few studies reported under grant support indicate that nervous and psychological factors must be considered in the complex process of hypertension.

Limited evidence indicates that persons prone to hypertension induced by nerves tend to give a positive skin reaction to injections of histamine. Such a test may help to distinguish such patients from those affected more by glandular or kidney action. Psychological tests and psychiatric interviews also may prove useful

for this purpose, in view of results obtained from a study of college women.

Clinical Hypertension

Clinical investigations have been directed at discovering changes in function and composition of the body occurring in humans during the course of hypertension. In these studies several substances found in the blood are investigated as possible factors causing or maintaining elevations in blood pressure. Among these are:

Serotonin. A material normally found in the blood and taking part in the mechanism of blood clotting, but also a powerful constrictor of blood vessels.

Pherentasin. A highly active constrictor substance rarely present in the blood of mammals but isolated in the blood of hypertensive patients.

VEM (vasoexcitor material). A substance produced by the kidney to maintain blood pressure during shock.

Corticotrophin (ACTH) and cortisone. Hormones produced by special glands of the body that help regulate body function.

Epinephrine and nor-epinephrine. Hormones produced by the adrenal glands that act in controlling heart rate and blood vessel tone.

Dr. Hugh Rodman Leavell

Hugh Rodman Leavell, M.D., Dr.P.H., was chosen president-elect of the National Health Council by its board of directors in December 1954. He takes the place of T. Duckett Jones, M.D., who died on November 22, 1954.

Dr. Leavell, recently the president of the American Public Health Association, has been professor and head of the department of public health practice of the Harvard School of Public Health since 1946. He will succeed to the presidency of the council at its annual meeting in March 1955.

The membrane filter technique described holds promise for the more extensive use of enterococci as indicators of the sanitary quality of water and other materials.

Use of the Membrane Filter Technique To Enumerate Enterococci in Water

By L. W. SLANETZ, Ph.D., D. F. BENT, M.S., and CLARA H. BARTLEY, Ph.D.

ALTHOUGH tests for coliform organisms are still generally used to determine the sanitary quality of water, there continues to be much interest in the use of enterococci as indicators of fecal pollution. Considerable evidence is available to show that the presence of enterococci in water or in other materials may more accurately indicate fecal contamination than the presence of coliforms since it is difficult to establish the fecal origin of the latter organisms. A number of investigators have shown that the enterococci are present in feces, sewage, and polluted water and that they are not found in water, soil, or other materials free from human or animal contacts or contamination.

Dr. Slanetz is professor of bacteriology and chairman, department of bacteriology, University of New Hampshire. Mr. Bent and Dr. Bartley have been associated with Dr. Slanetz, Dr. Bartley as assistant professor of bacteriology, and Mr. Bent as a graduate assistant at the university. Mr. Bent is now at the University of Maryland, as a graduate assistant in the department of bacteriology.

This paper was presented in part at the 54th general meeting of the Society of American Bacteriologists, May 2-7, 1954, in Pittsburgh.

As early as 1900, Houston (1) demonstrated that streptococci are present in polluted waters and appeared to be absent in nonpolluted samples.

When Mallmann and Sypien (2) in 1934 compared the coliform and streptococcus indexes of samples of water taken 5 feet from the shore of a bathing beach, they found that while the coliform indexes and total plate counts did not always respond to changes in bathing loads, the streptococcus indexes did. The streptococci were not found at points free from bathing pollution although the coliform organisms were present in such areas.

Winter and Sandholzer (3) also reported that coliform organisms persisted for a great distance from the source of pollution in water, but that the streptococci did not. They found that although streptococci were present in all samples of human and animal feces tested, these organisms were never found in virgin soils or in soils from wooded areas.

Ostrolenk and Hunter (4) demonstrated that in 37 percent of 51 fecal specimens which they examined, enterococci occurred in equal or greater numbers than did *Escherichia coli*. In the remaining 63 percent of the specimens, *E. coli* exceeded enterococci numerically by from 1 to 5 decimal dilutions. These investigators suggested that the lower number of enterococci in

human and animal feces does not necessarily minimize the potential sanitary significance of fecal streptococci.

Mallmann and Litsky (5), using a dextrose azide broth, were unable to isolate enterococci from soils which were not treated with sewage or animal manure. Although the coliforms were found to persist in sewage-treated soil, the enterococci were found to die out rapidly but not as rapidly as virulent typhoid bacilli.

The lack of suitable methods and media for the detection and estimation of the numbers of enterococci in water or other substances has been one of the chief problems in the use of these bacteria as indicators of fecal pollution. This situation may also account for variations in results reported in the estimation of numbers of these organisms in fecal specimens or in water.

In recent years, much progress has been made in the improvement of techniques for the cultivation of these organisms from various materials. Important contributions have been made by Mallmann (6), Winter and Sandholzer (3), and others (7-11). Because many of these papers have been reviewed briefly by Litsky, Mallmann and Fifield (11), they will not be discussed here.

Mallmann and Seligmann (10) compared standard lactose broth, sodium azide broth (Mallmann), Hajna and Perry S.F. (*Streptococcus faecalis*) broth (Difco), and Rothe azide dextrose broth (Difco) as media for the detection of streptococci in water and sewage. Mallmann and Seligmann noted that the Rothe azide dextrose broth gave the best results for the quantitative determination of streptococci. However, the tubes had to be checked microscopically since gram-positive bacilli might be responsible for turbidity in the cultures. They suggested that azide dextrose broth be used as a new means for testing and measuring streptococci in water, sewage, and shellfish, or in other materials suspected of sewage pollution.

Litsky, Mallmann, and Fifield (11) attempted to develop a confirmatory medium so that an enterococcus index could be obtained in a manner similar to that used for coliforms by the present standard methods procedures for water analysis. These investigators were able

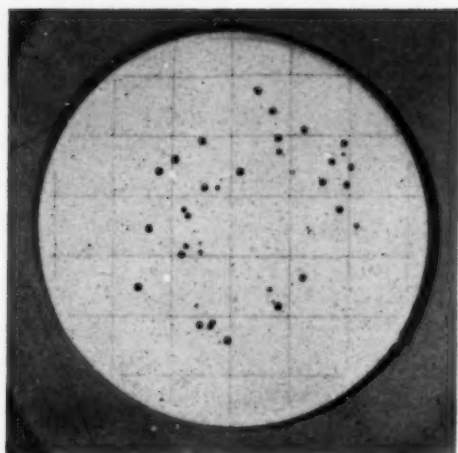
to prepare a medium containing ethyl violet and sodium azide, a medium which they found highly selective and specific for the growth of enterococci. They proposed a new test for enterococci which would use the dextrose azide broth as a presumptive medium and the ethyl violet azide broth as a confirmatory medium. The dextrose azide and ethyl violet broth procedure detected and confirmed 100 to 1,000 times as many enterococci as did the Hajna-Perry S.F. method and the Winter-Sandholzer procedures.

In the present study, our interest was in determining whether, by using the membrane filter technique, methods and media could be developed for the detection and enumeration of enterococci in water. Efficient filter techniques for detecting coliforms in water had been reported by Clark and associates (12), Goetz and Tsuneishi (13), Kabler (14), and others, and there is also a report now in press (15). Thus, it was thought that similar procedures might prove valuable for determination of enterococci.

Materials and Methods

Two types of membrane filter—Millipore (A) and Bac-T-Flex (B)—and the apparatus supplied for both types were used in these studies. The filters were sterilized by placing them between S&S absorbent pads (B), wrapping them in desired numbers in kraft or some other type of wrapping paper, and autoclaving at 121° C., at 15 pounds pressure, for 10 minutes. Then the steam pressure was reduced rapidly to prevent condensation of water on the membranes. When ready for use, the filters and pads were handled by placing them in sterile petri dishes. The filter apparatus was sterilized by autoclaving at 121° C. for 10 minutes also.

For the selective cultivation of enterococci, various media and inhibitory substances were tested for use with the membrane filters. These included: the Hajna-Perry S.F. broth; the Rothe azide dextrose broth; the Winter-Sandholzer sodium azide presumptive broth; the Chapman mitis-salivarius medium; the confirmatory broth of Litsky, Mallmann, and Fifield; and modifications of all these media. Each medium was also tested after the concentration of the nutrient materials was doubled.



Colonies of enterococci on a Bac-T-Flex filter. This picture has not been magnified. One hundred milliliters of polluted river water was filtered through this membrane before it was incubated on pads with the selective enterococcus medium.

To color the colonies of enterococci, 0.01 percent 2,3,5 triphenyl tetrazolium chloride (TTC) was added to the media. A stock solution of 1 percent of the TTC was prepared and sterilized at 121° C. for 15 minutes. Then just before use it was added aseptically in the required amounts to the broth media.

The filtration and cultivation procedures used during these studies were similar to those outlined for determination of coliform bacteria in water (12-15). The various culture media tested were added in 2.2-milliliter amounts to the absorbent pads. The desired amount of water sample or culture material was filtered through the membrane filters using a vacuum produced by a filter pump on water pressure. The filters were then transferred directly to pads containing the test media. These cultures were placed on a shelf about 1 inch above the water level in a covered water bath and incubated at 35° to 37° C. for 48 hours. After incubation was completed, colony counts were made using a stereoscopic microscope magnifying 10 times.

Cultivation of Enterococci on Filters

To determine the efficiency of various media for the cultivation of enterococci on the membrane filters, both dilute suspensions of *Streptococcus faecalis* and samples of polluted water

were employed. Of the different media listed in the preceding section on "Materials and Methods," a modification of the Chapman mitis-salivarius medium proved to be most satisfactory for the cultivation of enterococci on the filters. This modified medium was prepared as follows:

	Percent composition
Tryptone	2.0
Proteose peptone No. 3 (Difco)	1.0
Proteose peptone (Difco)	1.0
Glucose2
Sucrose	10.0
Dipotassium phosphate4
Sodium azide04

Final pH 7.0-7.2.

Sterilize at 121° C. for 15 minutes.

Prepare a 1-percent 2,3,5 triphenyl tetrazolium chloride (TTC) solution, sterilize, and add aseptically to above medium just before use to give 0.01 percent final concentration.

After preparation, the base medium was used within a 1-week period.

When this medium is used, the enterococci develop on the filters either as flat colonies, which are light pink in color, or as raised, glistening colonies which are dark red with a pink periphery. At the end of 48 hours' incubation of the cultures at 35° to 37° C., the colonies ranged in size from 0.5 to 2 millimeters in diameter. Although colonies could be detected after the cultures had been incubated for 24 hours, better growth was obtained when the incubation period was 48 hours.

On tests made with polluted river water, colorless colonies of gram-positive bacilli have occasionally developed on the filters. Preliminary tests have indicated that these organisms could be inhibited by the addition of 0.000012 percent ethyl violet to the medium, although concentrations of 0.00012 percent of the dye did not appear to inhibit the growth of the enterococci. However, since the gram-positive bacilli have appeared so rarely on tests made to date, ethyl violet has not been added routinely to our enterococcus medium. We have recently found that 4 percent tryptose and 1 percent yeast extract can be substituted for the proportions of tryptone, proteose peptone No. 3, and proteose peptone used.

When our medium was used in tests with pure cultures of *S. faecalis*, the colony counts on the filters were comparable to those obtained on tryptose glucose agar plates. As well as supporting good growth of enterococci, this medium proved to be highly selective and efficient for the cultivation of enterococci from contaminated water. Potassium tellurite and merthiolate were not suitable as selective agents since they also inhibit growth of the enterococci.

Efficiency for Enterococcus Counts

The efficiency of the membrane filter for the determination of numbers of enterococci in water, as used with our enterococcus medium, was compared with other procedures, particularly with the most probable number (MPN) methods described by Winter and Sandholzer (3) and by Litsky and his associates (11). Tests were made on water samples taken from

Table 1. Comparison of numbers of enterococci in water samples by membrane filter and Winter-Sandholzer techniques, and data on coliform densities

Sample No.	Enterococci		Coliforms	
	Filter technique	Winter-Sandholzer MPN technique	Filter technique	Standard 5-tube MPN technique
1-----	11	2	100	350
2-----	16	0	450	540
3-----	320	6.8	160	110
4-----	224	4.5	50	110
5-----	61	0	80	130
6-----	121	49	530	920
7-----	182	110	640	920
8-----	48	49	1,520	1,600
9-----	146	130	150	350

NOTE: Numbers indicate enterococci or coliforms per 100 ml. of water and represent an average of counts on duplicate Bac-T-Flex filters.

a reservoir and six different rivers. The coliform density for these samples was also determined by the standard methods MPN and by membrane filter techniques, which are similar to those outlined by Kabler (14) and are described in a paper now in press (15). Examples of the results obtained with the comparative filter and MPN techniques for coliform density and

the enumeration of enterococci are recorded in tables 1 and 2.

The membrane filter technique always gave higher counts for enterococci than did the Winter-Sandholzer method and gave higher counts than the procedures of Litsky and as-

Table 2. Comparison of numbers of enterococci in water samples, by membrane filter and Litsky-Mallmann-Fifield techniques, and data on coliform densities

Sample No.	Enterococci		Coliforms	
	Filter technique	Litsky-Mallmann-Fifield MPN technique	Filter technique	Standard 5-tube MPN technique
1-----	4	0	140	220
2-----	2	2	690	1,600
3-----	6	0	350	145
4-----	48	0	480	1,600
5-----	48	0	430	350
6-----	98	79	100	130
7-----	0	0	30	23
8-----	6	2	500	145
9-----	5	2	184	170
10-----	242	220	360	920
11-----	27	0	680	920
12-----	205	170	1,530	1,600
13-----	433	240	1,560	1,600
14-----	129	9.4	1,060	920
15-----	508	350	320	540
16-----	594	920	290	540
17-----	1,196	1,600	200	540
18-----	284	350	80	33

NOTE: Numbers indicate enterococci or coliforms per 100 ml. of water and represent an average of counts on duplicate Bac-T-Flex filters.

sociates for all but three of the samples listed. Thus, when it was used in conjunction with the membrane filters, our selective medium proved highly efficient for the detection and enumeration of enterococci in the water samples. The colonies of enterococci were pink to red in color, and practically all other types of bacteria were inhibited even when 100 milliliters of highly polluted water was filtered through the membranes (see the photograph).

During the study, more than 300 of these pink and red colonies were isolated from the membranes used for the tests on water samples reported in tables 1 and 2. These colonies were first inoculated into the confirmatory ethyl violet azide broth of Litsky, Mallmann, and

Fifield, and then further tested for their ability to grow in 0.1 percent methylene blue milk; in a glucose broth containing 6.5 percent sodium chloride; in a glucose broth adjusted to pH 9.6; and at a temperature of 45° C. All but six of the cultures so tested were identified as enterococci. These six cultures were isolated from red pinpoint colonies which were atypical and rough in appearance. For some of the water samples tested, all of the pink or red colonies which developed on a particular filter were cultured as outlined previously, and all proved to be enterococci.

In addition to its efficiency, the procedure, when compared with other techniques previously developed for the detection of these organisms, saves considerable time, labor, and materials.

Although the counts for enterococci were comparable on both types of membrane filters, the colonies could be counted more easily on the filters with the 8-mm.-square grid markings (B) than on those with the 3-mm.-square grid (A). Because the former filter is also the more flexible and durable of the two types, it was used for the majority of tests reported here. Also, the apparatus supplied by its manufacturer had the advantage of providing a larger filtration area on the surface of the membranes.

Although the numbers of coliforms were generally greater than the numbers of enterococci in the water samples tested, enterococci were detected in all samples containing coliforms except one. This was a sample of river water which had a low coliform index. The coliforms as determined by the filter and the standard methods MPN procedures were in good agreement. Further studies are necessary to establish the significance of the numbers of enterococci as compared with the significance of the numbers of coliform bacteria in the determination of the sanitary quality of water. However, it would appear that the medium and filter technique described in this paper provide a relatively simple and efficient method for the quantitative determination of enterococci in water or other materials. By use of this procedure, tests for these bacteria may thus prove to be more reliable for establishing the sanitary quality of water and foods than have tests for coliform organisms.

Summary

A highly selective and efficient medium has been developed for use with membrane filters in the detection of enterococci in water. With this membrane filter technique, the counts for enterococci were generally higher than those obtained by other procedures. The method affords a relatively simple and direct means for the determination of the numbers of enterococci in water or in other materials.

EQUIPMENT REFERENCES

- (A) Millipore filters (3-mm.-square grid markings) and apparatus. Supplied by Lovell Chemical Company, Watertown, Mass.
- (B) Bac-T-Flex filters (8-mm.-square grid markings), Coli 5 apparatus, and S&S absorbent pads No. 470. Supplied by Carl Schleicher & Schuell Co., Keene, N. H.

REFERENCES

- (1) Houston, A. C.: On the value of examination of water for streptococci and staphylococci with a view to detection of its recent contamination with animal organic matter. Supp. to the 29th annual report of the local government board containing the report of the Medical Officer for 1899-1900. London, London County Council, 1900, p. 458.
- (2) Mallmann, W. L., and Sypien, A.: Pollution indices of natural bathing places. *Am. J. Pub. Health* 24: 681 (1934).
- (3) Winter, C. E., and Sandholzer, L. A.: Studies of fecal streptococci. I. The isolation of streptococci from natural sources. U. S. Fish and Wildlife Service. Fish Leaflet 201. Washington, D. C., U. S. Government Printing Office, 1946.
- (4) Ostrolenk, M., and Hunter, A. C.: The distribution of enteric streptococci. *J. Bact.* 51: 735-741 (1946).
- (5) Mallmann, W. L., and Litsky, W.: Survival of selected enteric organisms in various types of soil. *Am. J. Pub. Health* 41: 38 (1951).
- (6) Mallmann, W. L.: A new yardstick for measuring sewage pollution. *Sewage Works J.* 12: 875 (1940).
- (7) Fleming, A.: On the specific antibacterial properties of penicillin and potassium tellurite. *J. Path. & Bact.* 35: 831 (1932).
- (8) Hajna, A. A., and Perry, C. A.: Comparative study of presumptive and confirmatory media for bacteria of the coliform group and fecal streptococci. *Am. J. Pub. Health* 33: 550 (1943).
- (9) Chapman, G. H.: The isolation and testing of

- fecal streptococci. *Am. J. Digest. Dis.* 13: 105 (1946).
- (10) Mallmann, W. L., and Seligmann, E. B., Jr.: A comparative study of media for the detection of streptococci in water and sewage. *Am. J. Pub. Health* 40: 286-289 (1950).
- (11) Litsky, W., Mallmann, W. L., and Fifield, C. W.: A new medium for the detection of enterococci in water. *Am. J. Pub. Health* 43: 873-879 (1953).
- (12) Clark, H. F., Geldreich, E. E., Jeter, H. L., and Kabler, P. W.: The membrane filter in sanitary bacteriology. *Pub. Health Rep.* 66: 951-977 (1951).
- (13) Goetz, A., and Tsuneishi, N.: Application of molecular filter membranes to the bacteriological analysis of water. *J. Am. Water Works Assoc.* 43: 943 (1951).
- (14) Kabler, P. W.: Water examinations by membrane filter and most probable number procedures. *Am. J. Pub. Health* 44: 379 (1954).
- (15) Slanetz, L. W., and Bartley, C. H.: Evaluation of membrane filters for the determination of numbers of coliform bacteria in water. To be published in *Applied Microbiology*.

East Coast Migrant Conference Report

Leaders from 10 east coast States and representatives of public and private groups working directly with migrant families met in Washington, D. C., during May 17-19, 1954, to work out steps that will lead to better health, schooling, and security for the children of migrants—and, to some degree, for their families. The movement of seasonal farm workers has long created problems, both for the migrants and for the communities where they live temporarily.

Conference participants explored many areas in which they thought action was needed. Health questions were concentrated on such subjects as health records, environmental sanitation and housing, and financing of health services. In the short time available, the conferees sketched out a general guide for action and for further exploration. Their ideas and specific proposals, together with individual reports from the States taking part, are contained in a 110-page report which is available upon request to Paul Blackwood, Room 3280, Department of Health, Education, and Welfare, Washington 25, D. C.

The conference was sponsored by agencies of the Department of Health, Education, and Welfare—the Public Health Service, the Children's Bureau, the Office of Education, and the Bureau of Public Assistance. The States represented were Delaware, Florida, Georgia, Maryland, New Jersey, New York, North Carolina, Pennsylvania, South Carolina, and Virginia.

The Commissioned Reserve In Defense and Disaster Health Services

THE DEVELOPMENT of health emergency services in the present era for a population as large and as widespread as that of the United States is one of the most urgent current problems before the health professions. Our experience in prior war periods, although helpful in some respects, has not prepared us realistically for meeting civil defense needs of the future. In fact, had not the superb military defense of our armed forces and those of our allies kept the enemy from our shores, the American people would have paid dearly in needless death and illness because of inadequate civil defense preparation. Today, the situation is vastly more dangerous; the hour is late for orienting our total health forces to the task.

Perhaps the most important and most difficult of the Public Health Service's new national defense responsibilities is the development of an adequate Commissioned Reserve Corps. Since World War II, the Service has been most anxious about the development and maintenance of a reserve commensurate with our existing and potential responsibilities. Although we have had statutory authority for a reserve since 1918, we have never been able to use the mechanism to its greatest advantage.

Our World War II experience proved that to be effective a commissioned reserve should be recruited in peacetime and adequately trained for call to duty in emergencies. The Service had to rely on hastily recruited and superficially trained reserve officers to help

State and Territorial health departments meet their needs for personnel in war areas. We also had to recruit and activate almost overnight many thousands of reserve officers for duty in the Office of Civilian Defense, the United States Coast Guard, the War Maritime Administration, the United Nations Relief and Rehabilitation Administration, and many other war organizations.

In any defense emergency, the total mission of the Public Health Service requires a strong reserve for a variety of activities. In the future, we can readily visualize a greater variety and a larger number of demands than we have known in the past. For this reason, we look upon our present responsibility to the Federal Civil Defense Administration as a long-awaited opportunity to begin the development of a Commissioned Reserve Corps in an orderly fashion—in a preventive fashion, if you will. We intend to combine our commissioning of reserves for civil defense with commissioning for our essential functions in war or other emergency.

The Public Health Service now seeks two primary objectives: first, to augment the supply of health personnel who will be available across the country; and, second, to assure their mobility. Mobility in a national emergency, such as enemy attack, obviously calls for commissioned personnel with credentials which can command transportation and admission through military lines.

Our aim is to augment—not to deplete—the available supply of personnel for duty in public health activities. We will work out with State and Territorial health officers plans for the most effective training and utilization of existing public health personnel through the Commissioned Reserve Corps. At the same time we will recruit actively outside State and local public health staffs. There are many valuable sources which have not been tapped. We have in mind the professional staffs of voluntary health agencies, universities, industrial health and safety services, and insurance companies,

Statement by the Surgeon General based on his annual message to the State and Territorial health officers, Washington, D. C., December 7, 1954.

for example, as well as competent individuals from the appropriate professional and technical groups.

The purpose of the entire program is to provide the organization, training, and mechanisms that will enable members of the health professions to serve to the best possible advantage in civilian services during a national crisis. We will use every available resource to train reserve officers in the health problems associated with atomic, biological, and chemical warfare, as well as in other emergency health problems.

We do not expect to call an officer in the emergency reserve to active duty without his consent, except in the face of a clear and present danger publicly recognized. Such an officer perform-

ing important health duties would not be moved to another area unless the situation clearly justified such a shift. Of course, members of the commissioned reserve may request active duty at any time.

It is to the self-interest of every State, Territorial, and local health officer to promote the development of the Public Health Service Commissioned Reserve, and the wholehearted cooperation of each health officer is strongly recommended in this important Public Health Service activity. Remember, the civil defense objective of the program is to provide indispensable health personnel for the protection of the people in each area should bombs fall or biological attack occur.

PHS Medical Research Grants

Surgeon General Leonard A. Scheele of the Public Health Service has announced approval of 972 grants for basic and applied research in many of today's major diseases. The awards, recommended and approved by the National Advisory Council, are administered by the National Institutes of Health. They were made in December 1954 to scientists in approximately 215 research institutions of the United States. More than half of the awards were for continuation of existing medical research projects.

The grants award program of the Public Health Service covers support of research in the medical and biological sciences, particularly heart disease, cancer, mental illness, arthritis and metabolic diseases, the neurological and sensory disorders, diseases of the teeth and mouth, and certain diseases of microbiological and parasitic origin. Other research projects supported by the program are concerned with the fundamental exploration of metabolic and biological phenomena underlying the causes of most of the prevailing noninfectious diseases.

A full or partial listing of the individual grants, broken down by investigator, project title, amount of support, and research institution is available from the Scientific Reports Branch, National Institutes of Health, Public Health Service, Bethesda 14, Md.

Evaluating Short Health Training Courses Through Content Analysis

By ALLEN D. SPIEGEL, M.P.H., THEODORE I. BLEEKER, M.A., and
SHIRLEY G. BORTOLUZZI, B.S.

THE ADDITION of content analysis to the armamentarium of the health educator provides a valuable tool for evaluating such programs as workshops, institutes, buzz sessions, and seminars. Content analysis can be applied to situations in which the participants freely express their critical opinions of the program without resorting to the use of a detailed evaluation form. The increasing popularity of short programs opens the way for content analysis which more easily measures opinions, attitudes, and feelings that are expressed spontaneously in a written comment. A content analysis reveals information not ordinarily determined by highly structured testing and opinion research methods.

Content analysis has been defined as "... a research technique for the objective, systematic, and quantitative description of the manifest content of communication" (1).

A study conducted by the bureau of public health education, New York City Department of Health, is, we believe, a unique example of

the application of content analysis to an inservice training program for dental hygienists. This report demonstrates how the method is applied and evaluates its use in this type of program. No attempt was made to gain evidence of changes in attitudes or behavior. The analysis was made to determine reactions to the training program.

The Dental Hygienist Training Program

An inservice training program for dental hygienists was planned by the bureau of public health education in consultation with the bureau of public health dentistry. The director of the bureau of public health dentistry requested that the training program have a direct relationship to the work of the dental hygienists and that each hygienist be given a feeling of active participation in the program.

Accordingly, as soon as preliminary outlines for the program were completed, a questionnaire requesting preferences as to subject was sent to all the dental hygienists. The questionnaire was developed by a health educator who had been a dental hygienist and who had knowledge of the group's problems.

One hundred four question sheets out of a possible 138 were returned. The subjects to be included in the group and in the panel discussions were decided on the basis of the returned questionnaires.

Mr. Spiegel and Mrs. Bortoluzzi are public health educators with the bureau of public health education, New York City Department of Health. Mr. Bleeker was formerly a public health educator with the bureau.

Three days were allocated to the inservice program held at a conveniently located health center. At the first session the chairman explained the objectives of the program. The choice of discussion groups in which members might participate on the second day of the institute was explained. Each hygienist was asked to write her first three choices of subject for each session. No one was put into a group not listed as one of her choices. This met the needs of the individual hygienist and provided a feeling of participation.

The afternoon session of the first day consisted of a panel discussion by various professionals of the many factors of a public health dental program. Time was allotted for a question and answer period.

The second day of the program was concerned with work problems. The morning was devoted to a "how-to-do-it" session and the afternoon, to a "talking-it-over" session. How-to-do-it sessions were concerned with teaching skills needed to perform job activities. In these groups, the leaders did some direct teaching, but many opportunities were allowed for the hygienist to participate, share experiences and problems, and find solutions.

Talking-it-over sessions were entirely of a group participation nature. The moderator served as a guide while the participants presented problems and reached solutions.

Each how-to-do-it session was serviced by a combination moderator-resource person, an observer, and a recorder. Each talking-it-over group had a moderator, a resource person, an observer, and a recorder. The recorders were dental hygienists from the groups. The others were public health educators, dentists, nurses, nutritionists, teachers, and social workers.

The "feed-back" sessions on the third day were devoted to discussing the written reports of the recorders. These reports were read aloud for the benefit of the entire group.

The inservice training program for dental hygienists was designed to:

1. Provide the latest professional information for the staff of dental hygienists.
2. Maintain the high professional standards of the staff.
3. Assist the dental hygienists to acquire the educational and professional knowledge and

skill to help them promote, organize, and operate better dental health education programs.

4. Help the dental hygienists acquire an insight into problems arising from interpersonal relationships between lay and professional persons encountered in the course of daily routine.

5. Stimulate discussion, participation, and resolution of problems by the dental hygienists through the group process in the inservice training program itself.

The first two objectives were the only original goals set up by the planning committee and were considered to be long range and continuing. The evaluation committee concluded that the implied aims of the two objectives should be included in a statement of objectives of the program. Therefore, the others were added to the two long-range goals before any evaluation was attempted.

The Method of Analysis

To evaluate the inservice training program, it was not feasible to employ questionnaires for determining preprogram and postprogram skills and attitudes. Nor were statistical methods involving control groups applicable. From the nature of the materials available, it appeared useful to attempt the content analysis technique.

The written reactions of the dental hygienists to each of the 10 group discussions constituted material to be subjected to content analysis. These anonymous comments presented an important opportunity for the evaluation of the degree to which the objectives of the program were attained. Reports of recorders and observers were also used in the evaluation.

Because of the large number of statements, a technique was required to organize the comments according to their relationships to the objectives of the program. Therefore, the immediate aims of the program were reviewed, and categories were determined for each of the goals. These categories represented separate pigeonholes into which each of the statements of the hygienists would be cast for qualitative and numerical examination.

To avoid bias in the analysis, all statements must have a category wherein they may rest easily. Four categories were set up with each

category representing one of the objectives (table 1).

To maintain the objectivity of the analysis and to minimize personal bias, several methods were used. First, indicators were agreed upon for each category. The indicators served as guides to determine the category for each reaction (table 2).

As a second method of maintaining objectivity, every reaction of the dental hygienists was placed in a category separately by each researcher and then recoded at a conference of all three researchers. Thus, 350 statements were categorized, with each of the 10 sessions' reactions kept separate. In some instances there was only one statement on a card to be coded. In other cases there were many statements on the reaction card.

Table 1. Relations between objectives and content analysis categories

Objective	Category
Implementation of classroom skills and knowledge.	{Statements referring to educational and professional knowledge and skills.
Improvement of group leader methods.	{Statements referring to group leader methods.
Discussion of interpersonal relations and participation in the group process.	{Statements referring to group participation and feeling.

NOTE: A fourth category was drawn up to encompass statements of a nonspecific critical nature.

By comparing the quality and quantity of statements relating to a particular objective, one has an easily manageable and more significant evaluative measure than would be possible with any other technique which must handle many freely expressed comments.

Analysis

In analyzing the comments of the 166 hygienists given during the 10 sessions (table 3), every effort was made not to change actual quotations of participants in assigning statements to the appropriate category.

Comments presented during two sessions, "how to speak at an assembly meeting" and "clinic dentist," are given in detail. The num-

Table 2. Categories and indicators

Category	Indicator
Educational and professional.	{Specific items of technique and of knowledge.
Group leader methods.	{Authoritarianism, permissiveness, teaching aids, and techniques.
Group participation and feeling.	{Group consensus, sense of identification and participation.
Critical statements-----	{Items of a nonspecific and specific critical nature.

bers in parentheses after statements indicate how many times the statement was repeated.

How To Speak at an Assembly Meeting

Knowledge and skills. There were five statements noting the recognition of general knowledge and skills as signified by the statement, "many new ideas." In addition, there were six separate statements referring to specific knowledge or a skill, such as, "motivate children."

Typical comments were: many new ideas on speaking to group (5); ideas on school cooperation (1); know your objective (2); know your audience (2); and motivate children (1).

Group leadership methods. There were three statements recognizing the positive contributions of the leader to the discussion. In opposition were two statements which reflected unfavorably upon the leader's ability.

Observers' statements which supported the favorable reactions were: At no time did the moderator allow time to be consumed by irrelevant remarks; the group never went off on tangents; and the moderator handled the group very skillfully in order to include all members in the discussion.

Reactions were: leader's instruction especially valuable (2); problem area fully covered (1); not enough time to go over mechanics of speaking (1); and problem led us afield of how to do it (1).

Group participation and feeling. All dental hygienist reactions showed cognizance of the group process, including active participation of members, recognition and solution of problems, and the benefits of interpersonal relationships. The group tone was favorable.

Supporting the favorable comments on group tone, the observer noted: The group as a whole

Table 3. Number of dental hygienists and frequency distribution of their comments according to category by session

Session	Number in group	Categories								Total comments
		Knowledge and skills	Group leadership methods		Group participation and feeling		Critical statements			
			Favorable	Unfavorable	Favorable	Unfavorable	Favorable	Unfavorable		
Classroom discussion.....	16	5	5	1	5	0	4	0	20	
Assembly meeting.....	12	11	3	2	6	0	14	0	36	
Parents meeting.....	15	10	0	8	6	1	6	3	34	
Audiovisual.....	21	16	3	2	6	2	18	0	47	
Tooth brushing.....	15	14	4	0	11	0	16	13	58	
How-to-do-it total.....	79	56	15 13 28		34 3 37		58 16 74		195	
Child in clinic.....	14	4	0	1	5	0	3	1	14	
Parent interview.....	20	2	1	0	18	0	20	0	41	
Home visit.....	23	7	0	0	1	0	6	6	20	
Clinic dentist.....	15	11	1	1	9	2	14	6	44	
Nursing staff.....	15	8	0	9	5	4	5	5	36	
Talking-it-over total.....	87	32	2 11 13		38 6 44		48 18 66		155	
Grand total.....	166	88	41		81		140		350	

and the members individually showed amazing enthusiasm and interest.

The comments were: many good suggestions and ideas brought to surface (2); served as catharsis—getting it off chest (1); group has covered problems and solutions quite well (1); benefited from experiences of group (1); and discussion very stimulating (1).

Critical statements. There are 14 subjective statements reflecting general approval of the session, the workshop process, and the personal benefits gained.

Observer commented that the group felt reasonably adequate solutions were arrived at but that there was not enough time for full discussion.

The hygienists said: enjoyed discussion very much (3); learned great deal from it (3); thought it was profitable (2); workshop idea excellent (3); gotten many good ideas and answers to questions troubling me (2); and it was fine and hope I can follow through (1).

Clinic Dentist

The coded comments of the hygienists participating in a talk-it-over session, "clinic dentist,"

are given for comparison with the above comments from the how-to-do-it session.

Knowledge and skills. Eight statements acknowledged the importance of developing good interpersonal relationships among clinic personnel and the necessity for critical examination of attitudes. Three other statements commented on general and specific techniques of cooperation.

The observer's report reinforced and elaborated the hygienists' statements expanding on the knowledge and skills that were discussed.

Hygienists commented: a matter of personalities and learning to get along (2); relationship between dentist and hygienist should be based on mutual understanding (2); cooperation makes more harmonious relations in clinic (2); develop a closer feeling toward work and co-workers (1); share duties (1); have no specific duties (1); gained information which will help to keep clinic (1); and able to learn from other's problems (1).

Group leader methods. Two comments of a contradictory nature were present: one favorable in a general sense, the other critical, showing a specific fault.

Observer noted that the moderator was skillful in resolving initial resistance. Further, the observer commented that the moderator kept the group on the subject.

Remarks were: too much straying from subject and moderator helpful.

Group participation and feeling. Nine statements mirrored feeling on the value of exchange of ideas, the sense of working together to resolve problems, the opportunities to share experiences, and the value of group discussion. Two dissenting comments noted that the topic was not suitable for group discussion and that the group should have been more homogeneous.

Observer noted that no one was prevented from introducing pertinent subject matter. The observer also noted that participation may have been restricted because of the presence of two dentists and a resource person.

The stated reactions were: problems common to most (2); opportunities for airing personal likes and dislikes (2); discussion group a fine way of learning (1); nice to get together to discuss problems (1); group discussion improves feeling toward work (1); exchanged solutions to personal problems (1); makes us feel we are working together (1); accomplish more with smaller group (1); and topic should not be discussed in groups (1).

Critical statements. The expressions affirmed the value of this type of session. Two further statements continued this theme by requesting more sessions of this type. Six comments of a negative nature regarded the session as having no value. Four of these felt it was the fault of the type of session and two felt the discussion was not useful personally. Two statements echoed the suggestion that clinic dentists should be present to air opinions.

Observer commented that the session had definite value even though solutions were difficult to achieve. The observer also remarked upon the anxiety of the group to continue similar discussions.

The comments were: dentists should be there to air opinion (2); discussion helpful (2); interesting and informative (7); sessions valuable to work (1); should have more sessions (2); can hardly solve problems (4); and not valuable to me personally (2).

The remainder of the groups were treated in the manner previously explained and illus-

trated. Following is a summation of the results of the overall sessions.

Summary

This summation is based on the method of content analysis as applied not only to individual sessions, but also to the program as a whole. Each category summarization represents a compilation of all comments from all 10 sessions in that category.

Knowledge and Skills

Eighty-eight comments were elicited from all sessions covering specific items of knowledge and skill, with a low of 2 for the "parent interview" and a high of 16 for "audiovisual aids."

In this category of knowledge and skills, the effectiveness of imparting the information has to be judged on two bases: the quality and quantity of the dental hygienists' comments and the supporting comments in this category by the observer and recorder. Quality refers to the degree of specificity of the comment. Those comments which referred to knowledge and skills in a nonspecific way were put in the category of critical statements. Content analysis alone did not seem to be sufficient for judging knowledge and skills acquired in this program.

Content analysis, however, does prove of benefit in numerically ascertaining comparisons of types of responses. More responses in knowledge and skills were made in the how-to-do-it session than in the talking-it-over session. This would seem to reflect the nature of the sessions.

Group Leader Methods

Content analysis proved most valuable in showing which staff members needed further training in group leadership. For example, in the session of "parent's meeting" there were eight unfavorable comments and none favorable. The nature of the comments indicated that this particular group leader probably needed training in motivational techniques and lesson planning.

The talking-it-over session produced a few comments on group leader methods. This is as it should be, since the session was designed to mute the leader's role and to encourage

democratic group participation. One session, produced nine unfavorable comments in this category. In reviewing the critical statements of this group, they showed that the leader lost direction of the group and did not fulfill the role of moderator. This leader should receive special training in group guidance.

Content analysis will help in the organization of future programs by determining which staff member should participate and which skills should be emphasized in their orientation training.

Group Participation and Feeling

Examination of the data for this category reveals a preponderance of favorable remarks relating to the group process. Significantly, even though group participation was new to many of the participants and therefore not many remarks could be anticipated in this category, the 81 comments showed that the dental hygienists recognized and commented on many aspects of the group process. These comments noted the various phases of group interaction, such as exchange of ideas, recognition of problems, solution of problems through discussion methods, and the good interpersonal relationships developed through this medium.

Content analysis would seem to be an effective tool for determining the intangibles of the group process which would be difficult if not impossible to ascertain using objective measuring devices.

Critical Statements

Statements in this category freely expressed the feelings of the hygienists on the value of the sessions. The majority of comments were favorable and they indicated that solutions were reached and the time spent was worth while. These general statements were inter-related to the other categories and served to reinforce opinion expressed more specifically elsewhere.

Suggestions

For those desiring to use content analysis for evaluative purposes, the following suggestions may be helpful:

1. All reaction forms should be drawn up explicitly to meet the objectives of the program while still giving opportunity for freely expressed narrative statements.

2. There must be a separate category for each objective of the program so that analysis may reveal the degree to which the program has succeeded in its attainment of each objective.

3. Objectivity in the analysis should be maintained through standardization of indicators and through cross checking by various members of the research staff in order to maintain reliability.

Conclusions

It has been demonstrated that the dental hygienists acquired an insight into problems of interpersonal relationships. Further, the dental hygienists appreciated and benefited from the discussion, participation, and resolution of problems through the group process. Content analysis did not show adequately the acquisition of professional knowledge and skills by the dental hygienists. The analysis was not able to measure the objectives of providing latest professional information and maintaining high professional standards, probably because these were long-range intangibles and this method does not readily lend itself to the evaluation of such factors. Generally, the evaluation showed that the program was a success and that the hygienists wanted to continue this type of inservice training.

REFERENCE

- (1) Berelson, B.: Content analysis in communication research. Glencoe, Ill., The Free Press, 1952, p. 18.

Sickness as Recorded in Family Surveys

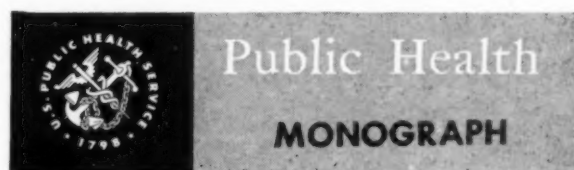
There are many ways to express the extent of deviation from normal health in an observed population, such as the incidence of new cases of illness, the days of illness during a given period, the days of illness per case, and the prevalence of illness at a given time. These and other measures can be expressed in terms of rates or ratios for all cases and for cases of different severities, such as nondisabling, disabling, confined to bed, and admitted to a hospital, together with days per 1,000 population and days per case for cases of each severity. Thus, morbidity from all causes can be expressed in many ways, aside from similar rates and ratios for specific diagnoses.

Detailed data on illness have been collected in six surveys by periodic visits at intervals of 1 to 3 months to households in the general population, covering nearly 100,000 full-time person-years of observation. These surveys made over the past generation by, or in cooperation with, the Public Health Service afford considerable data on 103 diagnoses for all recorded cases, and only about half a dozen less for cases disabling or confining to bed for 1 day or longer. This study represents a detailed analysis of these records of illness in the general population, supplemented by records of hospitalization, particularly of mental diseases, tuberculosis, and a few other chronic diseases.

In the study it was not feasible to follow chronic cases throughout their total duration, so cases and their durations were expressed as "episodes" of illness. This procedure made it feasible to get some idea of seasonal variation by a tabulation by months of onset of such cases or episodes as had their onset during the study period.

No detailed discussion is needed here, but a few summary statements should be made regarding important findings:

1. These studies indicate total annual cases of illness of 1,060 per 1,000 population, or about one illness per person per year. Of these cases, roughly half (565 per 1,000) were disabling for 1 day or longer, and the other half were not dis-



No. 25

The accompanying summary covers the principal findings presented in Public Health Monograph No. 25, published concurrently with this issue of Public Health Reports. The authors are with the Division of Public Health Methods, Public Health Service.

Readers wishing the data in full may purchase copies of the monograph from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C. A limited number of free copies are available to official agencies and others directly concerned on specific request to the Public Inquiries Branch of the Public Health Service. Copies will be found also in the libraries of professional schools and the major universities, and in selected public libraries.

. . .

Collins, Selwyn D., Trantham, Katharine S., and Lehmann, Josephine L.: Sickness experience in selected areas of the United States. Public Health Monograph No. 25 (Public Health Service Publication No. 390). 96 pages. Illustrations. U. S. Government Printing Office, Washington, 1955. Price 50 cents.

abling. Disabling is here used in the sense of causing the patient to be unable to perform his usual duties, such as work, housework, attending school, or other activities for 1 day or longer. Of these disabling cases, 405 per 1,000 population spent 1 or more days in bed because of the illness, and of the bed patients 56.4 per 1,000 population spent 1 or more nights in a hospital. These hospital patients constituted 10 percent of all disabling cases and 13.9 percent of all bed patients.

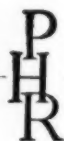
2. Of all disabling cases or episodes of illness, 13.4 percent were chronic; similar percentages of bed and hospital episodes of illness were 13.8 and 22.6, respectively. The mean duration of disability per acute illness or episode was 10.3 days, as compared with 63.6 days for chronic episodes; however, the annual days of disability per 1,000 population of the 5 surveys was 5,007 and 5,101 for acute and chronic illnesses, respectively, with a total for all cases of 10,108 annual days of disability per 1,000 population, or 10.1 days per person observed.

3. Of the acute disabling attacks, 96 percent were disabling for 30 days or less, as compared with 72 percent for chronics; to reverse the statement, only 4 percent of acute cases were disabled for more than 30 days, but 28 percent of the chronic cases were disabled that long. On the other hand, 24 percent of the acute cases were disabled for only 1 or 2 days, and 18 percent of the chronic episodes were disabled for only that long. Finally, 86 percent of acute cases were disabled for less than 18 days, and 47 percent of the chronic episodes involved less than 18 days of disability.

4. Variation with age and variation with season are shown for total cases of each specific diagnosis, and variation with age is shown for hospitalized cases for as many diagnoses as the smaller numbers justify. Variation with age and sex is shown for bed cases; for a few diseases the rates for women are exceptionally higher than for men, such as those of the thyroid gland, of the gallbladder and liver, appendicitis, neuritis, headache, nervousness, psychoneurosis, arthritis, diabetes, and injury by fall. On the other hand, some diseases had definitely higher rates for men, such as peptic ulcer, hernia, and traumatic lacerations.

5. The respiratory diseases show consistently greater seasonal variation, with peaks in January or February, with ear and mastoid diseases showing peaks also in February. The acute communicable diseases, hay fever, and the acute stomach and intestinal upsets also show large seasonal variation, but episodes of chronic diseases generally show much less seasonal variability.

6. Admissions to short-term general and allied special hospitals have increased rapidly since 1935, hospital days per 1,000 population less rapidly, but hospital days per hospital case have generally declined since 1935, and particularly since 1945. However, increases in hospital admissions and days of care per 1,000 population do not necessarily mean an increase in illness; higher incomes, the budgeting of hospital costs by insurance, and the increase in the general level of living have probably been large factors in the increase of hospital care even without any increase in day-to-day illness in the United States.



A Mental Health Program is Born

By MURRAY GRANT, M.D., D.P.H.

THE DEVELOPMENT of a mental health program in Cattaraugus County, N. Y., has been an avocation of many of the county residents and the county's civic and health organizations during the past few years. A major and tangible result of the community's efforts is a countywide mental health clinic, now established in the Cattaraugus County Department of Health and in operation since May 1954.

Cattaraugus County has a population of 80,000 and is located in the western part of New York State. Its main city, Olean, is situated 70 miles southeast of Buffalo. The county is approximately 40 miles long and equally wide. It is predominantly rural and would not be considered a particularly wealthy county compared with many others in New York State.

It was Dr. C.-E. A. Winslow who said many years ago that "It would be highly desirable for such a county as Cattaraugus to make at least a beginning in the recognition of its mental problems; and this could, perhaps, best be accomplished by providing a psychiatric social worker to serve jointly with the social service staff and nursing staff of the county department of health. Through such a worker the extent of the local needs could at least be visualized and the county prepared to take its part in the development of the future" (1).

Dr. Grant has been commissioner of health of the Cattaraugus County Department of Health, Olean, N. Y., since 1951. He began his public health career in 1950 as assistant health officer of the Baltimore County Health Department in Maryland.

Mental health was recognized as a proper health department activity in the early days of the county health demonstration established by the Milbank Fund. As early as 1926 a psychiatric social worker was employed by the county health department, primarily as a consultant to the public health nurses. Although this experiment lasted only a few weeks, it showed that the importance of mental health in a public health program was recognized, even in those days. The New York State Commission for Mental Defectives has operated occasional mental health clinics in the county, and during 1924 and 1925 made 50 psychological examinations. In addition, Gowanda State Hospital, located just outside the county, has operated clinics within Cattaraugus County. These clinics are still maintained 1½ days a month, but they are now reserved for convalescent patients.

In April 1951, a Mental Health Committee was organized as part of the Cattaraugus County Tuberculosis and Public Health Association. This group became interested in stimulating a mental health education program. It held a number of meetings, distributed pamphlets, had several programs on the local radio station, and prepared news releases for publication in the local newspapers.

This committee proved there was an interest in the field of mental health, and, in March 1952, the committee was reorganized and renamed the Cattaraugus County Mental Health Society. It was still associated with the tuberculosis and public health association. Every possible effort was made to obtain representation from many interested individuals and agencies as well as to insure that the various geographic areas of

the county were represented. The following groups formed the nucleus of the society: county welfare department, Catholic charities, the clergy, county board of health, school authorities, parent-teacher associations, children's court, chamber of commerce, and the county medical society. In addition, members of the tuberculosis and public health association and the county health department became a part of the society. A factfinding committee was appointed at the initial meeting and asked to get information on mental illness and facilities in the county. This committee sought from various agencies and groups in the county answers to a number of questions such as:

1. What is the mental health need as determined by the number of patients in mental hospitals?
2. What preventive and treatment facilities are available locally?
3. What local professional groups are concerned with mental health?
4. What other community agencies or organizations influence mental health?

At the next meeting of the mental health society in May 1952, five committees were formed to investigate the various phases of the mental health situation which had been uncovered by the factfinding committee. These five committees had one of the following functions:

1. To investigate the need for a mental health clinic in the county.
2. To determine the need for, and practicability of, a psychiatric wing in one of the local hospitals.
3. To ascertain the best ways in which to disseminate mental health information.
4. To explore the possibilities of integrating mental health principles into the local governmental agencies.
5. To determine whether it would be desirable to promote local mental health groups in each community.

Clinic Activities to the Fore

Each of these committees met to discuss the problems to which it had been assigned. At the next general meeting of the society in September 1952, it was clear that the group had become particularly interested in mental health

clinic facilities. This was something tangible. This was a project which could lead to a sense of proud achievement and could form a base from which to approach the problems the group had found.

I need hardly interpolate that the county health department and the tuberculosis and public health association played a leading role in all of the foregoing activities and helped stimulate the mental health society by pointing out the possible avenues for exploration. At the same time a considerable number of news releases were drawn up to insure that the public was kept well informed of all developments.

The Committee on Mental Health Clinics became very active. Extensive inquiries and investigations were made. Speakers were obtained to talk on the subject at public meetings to which various civic officials were invited. People from all ends of the county attended the meetings.

The committee reported that Cattaraugus County had very little in the way of facilities to which the emotionally disturbed could turn. They could, of course, be committed to a mental hospital for observation and treatment. But this procedure was accepted with reluctance. There was no psychiatrist in the county, and, in general, residents of Cattaraugus County had to travel up to 70 miles for psychiatric care. Very few did this. The New York State Department of Mental Hygiene operated a traveling child guidance clinic one day a week. However, this service was very limited and did not, in fact, cover much of the county. Moreover, very little treatment was offered, and, since none of the clinic team members resided in the county, it was often difficult to reach them. In addition to this facility, the closest mental hospital, which was located just outside of the county, operated a clinic for adults 1½ days a month. However, this clinic was confined chiefly to patients convalescing from care at the mental hospital. The committee concluded that a mental health clinic was needed in Cattaraugus County. The remainder of the society agreed.

In the meantime, both the health department and the tuberculosis and public health association were active in stimulating local interest

in the project. While the association promoted and prepared mental health exhibits for the county fair, the health department was busy publicizing the matter widely. A mental health nursing consultant from the New York State Mental Health Commission was engaged to provide inservice training for the public health nurses. In addition, both organizations worked together in promoting the establishment of citizens' health committees in two communities in the county. These committees also helped inform the people of the area of the importance of mental health.

Funds and a Home

The next problem was to determine how a clinic could best be established and how it should be organized and administered. Possible sources of funds were considered—the New York State Mental Health Commission, the schools, public subscription, and the county health department. At another public meeting it was finally agreed that the clinic could best be organized and administered as a division of the county health department. Accordingly, in May 1953, the chairman of the county mental health society asked health department officials if they could include an appropriation of \$30,000 in the department's budget for the year 1954 to establish a mental health clinic. This amount included funds for a full-time psychiatrist, clinical psychologist, psychiatric social worker, and a secretary. Although appropriated from county funds, 50 percent of the amount would be subject to State reimbursement.

In the meantime, health department officials had discussed the proposed clinic with the county medical society, with the county board of health, and with some of the prominent members of the county board of supervisors—the department's appropriating body.

In September 1953, the county board of health passed the health department budget, including in it \$21,240 for a mental health clinic for the year 1954. The difference in this figure and that suggested by the mental health society was due chiefly to the fact that the psychiatrist was to be employed on a part-time instead of

a full-time basis. A psychiatrist employed part time, it was suggested, could work 3 days a week for the health department and devote the remainder of his time to private practice. It was pointed out that not only would this arrangement be more likely to appeal to a psychiatrist, but also it was believed unlikely that the board of supervisors would pass a budget containing a salary high enough to attract a full-time psychiatrist. Plans to house the clinic in the health department and make other use of existing facilities helped keep the budget low. This, then, was the budget submitted to the county board of supervisors for their consideration.

Much now remained to be done to show members of the board of supervisors and the public at large why the mental health clinic was needed and how it would operate. A tremendous amount of effort was used by members of the mental health society and others through personal contacts, talks, and preparation of newspaper releases. In October 1953, the county medical society sent a resolution to the board of supervisors endorsing and recommending the establishment of a mental health clinic within the health department as proposed in the 1954 budget. This budget was adopted in November 1953 by the board of supervisors.

A psychiatrist, who met the required qualifications and was also socially acceptable to a fairly rural community that is not subject to much change was obtained and began work in the clinic in April 1954. Soon afterward all the other members of the clinic team were appointed, and the clinic actually commenced operation in May 1954.

In Operation

The people in the county had shown a great deal of interest in the clinic. To retain and advance that interest an advisory committee was formed in March 1954 to help develop policies and procedures for the mental health clinic and to assist in interpreting the clinic's functions to various agencies and communities in the county.

The advisory committee was composed of representatives of the welfare department, children's court, Catholic charities, school authorities, the medical society, the mental health society, Alcoholics Anonymous, industry, the

tuberculosis and public health association, the county board of health, and the clergy. Actually, many of these persons formed the nucleus of the mental health society. The committee had its first, and very successful, meeting in April 1954.

In the first 3 months of operation there were 228 visits to the mental health clinic. The patients, both children and adults, were referred by physicians, the welfare department, clergymen, schools, public health nurses, and the children's court. Some of them came without referral. In general, the clinic sees all comers, although persons under the age of 16 are not interviewed until a parent has been seen. All patients have an initial orientation interview with the psychiatric social worker, who determines whether the patient requires psychiatric and psychological examinations. After completion of a psychiatric examination, the members of the clinic team meet to discuss the case and formulate plans for treatment.

The clinic has just started, of course. Much work remains in combining the clinic service

with an education and training program for physicians, nurses, school personnel, and others. We are headed in this direction, but we realize that it will take time. Already one of the community health committees mentioned previously has formed a mental health committee to work with the mental health clinic team, and I feel sure that many others will follow.

At present, we are in the process of interpreting the intake policies and procedures for the clinic to other agencies and groups. We hope to bring other members of the health department and other agencies and individuals into close association with the mental health clinic team so that the mental health clinic will form the nucleus of a complete mental health program that will reach into all areas of the county.

REFERENCE

- (1) Winslow, C.-E. A.: Health on the farm and in the village; A review and evaluation of the Cattaraugus County health demonstration, with special reference to its lessons for other rural areas. New York, Macmillan, 1931, 281 pp.

PHS Advisory Council Appointment

Dr. Currier McEwen, dean of New York University College of Medicine since 1939, has been appointed to the National Advisory Arthritis and Metabolic Diseases Council. Dr. McEwen is chairman of the Medical and Scientific Committee and a board member of the Arthritis and Rheumatism Foundation. He is also chairman of the Medical Advisory Council of the Masonic Foundation for Medical Research and Human Welfare and co-chairman of the New York University Study Group on Rheumatic Diseases. Dr. McEwen obtained his medical degree at New York University, and he was awarded the honorary doctor of science degree by Wesleyan University and by Marietta College. He served his internship at Bellevue Hospital in New York City. He was associated with the Rockefeller Institute from 1927 to 1932 and then went to New York University College of Medicine to become assistant dean and instructor in medicine.

Representing Pennsylvania's third annual health conference, held in August 1954 at State College, Pa., are the papers summarized in this section. Four deal with chronic illness and one with the work of the local health laboratory.

Pennsylvania Health Conference

Cardiovascular Health Center in New York



In coronary heart disease and hypertension, foremost among chronic disease control problems, much excellent research is being done to improve our understanding of the basic mechanisms causing the conditions.

Keys, for example, has gathered much evidence for the theory that a high proportion of fat in the diet is related to the development of atherosclerosis of the coronary arteries. He has demonstrated that countries having a high proportion of fat in the diet also have high death rates from degenerative heart diseases. Morris and co-workers suggest that occupational groups associated with physical exercise have lower death rates from coronary heart disease than do those who work at more sedentary pursuits. Gertler and associates have mar-

shalled evidence that persons of the mesomorphic-endomorphic body type seem especially prone to develop coronary heart disease. Levy and associates have pointed out that hypertension develops in individuals who have labile blood pressure or tachycardia. The relationship of obesity and hypertension is also well known.

For a long while official health departments have been waiting for basic studies to give answers which can be translated into control programs. Meanwhile most health officers have contented themselves with some peripheral activities in the heart disease field, such as post-graduate education of physicians and nurses, provision of cardiac consultants for certain clinics, and the extension of public health nursing services to cardiac patients. A few departments have become interested in rehabilitation of the cardiac patient, largely a problem of the patient's attitude and that of his employer toward the disease.

Health Department Job

But none of these measures is meeting the main issue. Knowledge required for the control of disease has often preceded that concerning its etiology and pathogenesis. The public health physician has behind him years of experience in controlling diseases before their cause has been determined. This has been true of cholera and typhoid fever, the prevention of leukemia among radiologists, and the control

By George James, M.D., M.P.H., assistant commissioner for program development and evaluation, New York State Department of Health, and associate professor of preventive medicine and public health, Albany Medical College, New York.

of diabetes. Adult heart disease may present more of a challenge, but this should serve mainly to give it a high priority for our public health resources.

One method of approach open to official health agencies is a study of the epidemiology of coronary heart disease and hypertension. Departments of health have teams of trained epidemiologists, statisticians, and, recently, social scientists. They possess the legal responsibility to take necessary measures to control prevalent diseases. Health departments, furthermore, are the legal custodians of morbidity data, and through their liaison with medical and other professional societies and their association with industrial health programs, they are indeed in a fortunate position to pursue such studies.

But the official health agency has a far greater responsibility than the undertaking of discrete epidemiological studies. It must mobilize its resources more completely for a large-scale, long-term study of coronary heart disease and hypertension.

New York Study

In New York State it was decided that the official health agency is not only able to undertake long-term longitudinal studies, it is the organization best able to make them. This decision led to the establishment of the cardiovascular health center program in February 1953.

The cardiovascular health center has been established as a part of the Albany Medical College under contract with the New York State Department of Health. The dean, professors of medicine and radiology, and the associate professor of medicine for cardiology are members of the governing council. The close and continuous association of the project with a medical school makes available to it all the clinical specialties and preclinical science departments of the school.

Another essential of such a project is close and continuous association with the professional personnel of the State health department. The governing council of the cardiovascular health center includes the commissioner of health and the assistant commissioners of medical services,

laboratories and research, and program development and evaluation. In addition, at a series of training and discussion staff meetings, all the bureau directors were asked to devise ways in which their programs could assist the heart disease activities and goals of the cardiovascular disease center and how, in turn, the center's activities could assist their programs. The program development and evaluation unit maintains continuous liaison between the center and the other programs of the State health department. Statistical service is provided by the State health department.

A third criteria is a suitable stable population of sufficient size, willing to cooperate in this type of study. The male civil service population between the ages of 40 and 54 in the Albany area, numbering about 2,000 individuals, was selected as a group of sufficient size, stability, and susceptibility to give statistically significant results under a program of long-term study of the cardiovascular center. Eighty-seven percent of those contacted have received the first examination on a voluntary basis and have agreed to follow through the periodic examination program at the center. Participants with significant medical findings are referred to their private physicians for treatment.

An attempt is being made to discover how to diagnose coronary heart disease and hypertension in the earliest possible preclinical phase. This diagnosis will make epidemiological studies of these conditions more effective by broadening the number of conditions that can be listed as early stages of these diseases.

Diagnostic Tests Applied

The center is applying existing diagnostic tests periodically to the same population. As cases of coronary heart disease accrue, we may then search back through the examination records in the hope of discovering which findings suggest the development of degenerative heart disease. Keys has suggested that more attention should be paid to the measurable variations among so-called normal individuals, since some of these differences may be significant in predicting the development of later chronic illness. Preliminary blood pressure and weight measurements made at the center on 1,054 par-

ticipants in the study suggest that the higher blood pressures tend to occur more frequently among persons of greater body weight.

Among the tests used by the center is an electrocardiogram following measured physical stress administered either through the Master's stairstep test or the treadmill. Of the first 1,072 participants studied, the diagnosis of coronary heart disease was made in 27 cases in the preliminary findings. Nine were in groups diagnosed by history alone, 10 by history plus electrocardiogram, and 8 by electrocardiogram alone. In the latter group, three cases were discovered solely through the use of the stress test.

In this type of project the applicability, reliability, and validity of existing diagnostic tests for heart disease should be studied in order to discover which are suitable for more general application to the community. This information, too, will facilitate future community epidemiological studies. Tests made at the center indicate that cardiac enlargement can be measured by both X-ray and electrocardiogram and that each of these techniques discovers a group not discernible to the other. Studies are also proceeding on the use of skinfolds in the determination of obesity and on the cost, availability, speed, and safety of the various detection tests proposed for wider usage.

The cardiovascular health center must serve as a core for research teams interested in performing both basic and applied research. Thus, it is working in cooperation with the new protein laboratory of the New York State Health Department, which has ultracentrifuge, electrophoresis, and blood fractionating equipment for the study of lipoproteins. The State laboratory, with its long experience in immunology, can study possible parallels between this field and the biological mechanisms responsible for chronic disease. The bureau of nutrition of the department is investigating the obesity measurements and diet histories of participants. Social scientists in the department are interested in social and emotional stress and heart disease. Epidemiologists are taking retrospective histories on hospital patients to check the association between clinical heart disease and certain factors. Members of the Albany Medical College department of medicine

are engaged in studies on basic physiological mechanisms associated with the cardiovascular status of the participants.

Progress in State Rehabilitation Program



Some time during our lives each of us has seen someone fall victim to a serious crippling disease or disabling injury; some we remember as "shut-ins," while others we hazily recall as being in the hospital for a long time. Some get around a little, trying to work occasionally at odd jobs; the others are confined to a bed or wheelchair.

Many of these people just seem to disappear from our personal lives. They join that army of disabled people who fill the chronic disease hospitals, the back bedrooms of thousands of homes, the mental institutions, the nursing and convalescent homes, the institutions for the aged and infirm, and homes for the poor. Physicians and nurses know about them, for the institutions are so crowded that applicants and their families must be carefully screened and checked to make sure that only the most urgent cases are accepted.

Decade of Progress

We have recently closed a significant decade of progress in rehabilitation in which we have discovered that many men and women formerly destined to lead a life of dependency can be rehabilitated. The way has been pointed toward a more complete approach to the problems of the disabled person. No longer do we consider the social, physical, or economic effects of a disability as separate entities in an individual.

By Floyd L. Kefford, chief of physical restoration, bureau of rehabilitation, Pennsylvania State Board of Vocational Education.

Rather we see the many phases composing the individual as interrelated, one with another—his job, his family, his physical condition, his place in the community, his desires, and all of the attainable factors comprising the entire person.

It is also possible with the new drugs, the improved techniques of surgery, better hospital facilities, the establishment of comprehensive rehabilitation centers, and the employers' realization that ability, not disability, counts that thousands can leave their wheelchairs, their hospital beds, and their homes to become self-sufficient.

Ten years ago who could foresee that a paraplegic mother bedfast in her home could be physically improved enough to resume the responsibilities of raising her children and making a living for her family; that a boy so badly crippled with arthritis that he was unable to bend any joints except those in his arms and hands could become a successful watch repairman; that a 45-year-old railroader, forced to give up his chosen vocation because of a severe cardiac condition, could undergo surgery enabling him to return to full employment.

Maximum Help

Pennsylvania has demonstrated that these citizens can be improved physically and prepared vocationally for employment through the services of the bureau of rehabilitation, a State agency under the supervision of the Pennsylvania State Board of Vocational Education. With its trained staff of counselors, medical consultants, and full complement of services, which include medical and psychological evaluation, surgery, hospitalization, appliances, vocational training, and maintenance, the bureau is prepared to help chronically disabled clients achieve maximum rehabilitation.

Probably the most important single factor in the development of Pennsylvania's rehabilitation program during the past 10 years was the inclusion of physical restoration as a part of the services offered by the bureau of rehabilitation through enactment of Public Law 113 in 1943. By the passage of this bill the Federal-State rehabilitation program definitely joined hands with the men of medicine. Their knowl-

edge of how physical defects can be reduced or corrected plus the counselor's knowledge of how to prepare a client for a suitable vocation made it possible to achieve maximum rehabilitation for the client with a chronic disability.

Before this phase of the program was developed the counselor encountered many problems. He was required to "rehabilitate around" a disability which could have been reduced or corrected with good medical services. A young girl with an unattractive clubfoot supported with a brace, for example, was helped in her mental adjustment, trained for suitable work, and placed in a remunerative job, but the chronic physical condition remained. Today, through the physical restoration services available in the bureau's program, such a case would be treated differently. The foot could be amputated and the client fitted with an artificial limb. Taught to use it and to dress and walk like other girls her age, she would have little left of her "chronic disability."

For persons with cleft palates and harelips—to illustrate from a different area—rehabilitation was not considered feasible because the disability interfered with the client's preparation for an occupation commensurate with his capabilities or with his attainment of experience necessary for entering an occupation. Many of these people were placed, without service, in jobs requiring menial labor, where they did physical work but gained no mental satisfaction. This deepened their emotional problems, and they were considered misfits in society. Now it is possible to provide these clients with prosthetic appliances which enable them to speak and with surgery which can reduce the disability to the point where one would hardly be aware that it exists. For such persons the physical restoration program has opened a new world.

60 Percent of Total

But what has all this to do with meeting the problems of those who are handicapped because of a chronic disability? A review of the bureau's case records of the 3,011 persons rehabilitated in 1953 revealed that 1,817 of them were disabled because of disease, amounting to 60

percent of the total rehabilitated. Among these 1,817 clients are cases of poliomyelitis, epilepsy, hemiplegia, paraplegia, cardiac involvement, mental illness, diabetes, tuberculosis, bronchiectasis, silicosis, hearing deficiency, Buerger's disease, cerebral palsy, and cancer. Today these people are all gainfully employed and are now "tax-paying" instead of "tax-costing" citizens.

The bureau has not provided rehabilitation services for narcotic addicts, but it has helped many disabled individuals who, because of their disability and the factors involved, have become alcoholics. The division of alcoholic studies of the Pennsylvania Department of Health is now establishing facilities throughout the State for the treatment of alcoholics, and the bureau of rehabilitation is planning to assist in the rehabilitation of those who in addition to being alcoholics also have employment handicaps.

In 1953, the State legislature appropriated more than \$2 million for the construction of a comprehensive rehabilitation center in Pennsylvania. With the completion of this facility and the expansion of the rehabilitation program through passage of new laws by Congress in 1954, the bureau's program will provide additional services for chronically disabled individuals.

Chronic Disease Factor In Public Assistance



Studies of public assistance recipients in Illinois, Connecticut, New Jersey, and Wisconsin show that about one-fourth are chronic invalids. An analysis of the public assistance rolls in Pennsylvania indicates about the same proportion of chronically ill persons.

By Robert P. Wray, deputy secretary of the Pennsylvania Department of Public Assistance.

On Pennsylvania's present assistance rolls are 60,000 persons, age 65 or over, in the old-age assistance category; 16,000 persons in the blind category; 12,000 permanently and totally disabled persons in the aid-to-disabled category; 103,000 persons in the aid-to-dependent-children category, approximately 26,000 of them adults; and 42,000 persons receiving general assistance, most of whom are adults. It is observed from the description of these categories that the bulk of assistance recipients who are chronic invalids are in the old-age assistance, blind pension, and aid-to-disabled categories. Collectively these constitute the hard long-time core of the public assistance rolls.

Cause of Impairments

A study the Pennsylvania Department of Public Assistance made of the social and medical characteristics of persons receiving financial help in the aid-to-disabled category showed that three types of diseases or conditions account for nearly two-thirds of all the major impairments suffered by these recipients. Heart and circulatory diseases rank first and account for 33 percent of the major impairments for the total group. Paralyzing conditions account for 20 percent of the impairments, and arthritis and other bone diseases fall in third position with a rating of 12 percent. Respiratory diseases, mental and psychiatric disorders, and tuberculosis each accounts for 6 percent of the major impairments. Three percent of the total impairments are attributable to cancer, syphilis, ear and eye diseases, and epilepsy, respectively. Diseases of the digestive system occur in 2 percent of the recipients, and diabetes is the cause of the major impairment in 1 percent of the cases. The other 2 percent of the recipients have a variety of major impairments that are too diversified to classify.

Forty-two percent of the group studied had been impaired for 10 or more years; 20 percent, between 5 and 10 years; 27 percent, between 2 and 5 years; and in 8 percent of the instances the elapsed time since disablement was less than 2 years. The period of disablement was not reported for the remaining 3 percent.

Approximately 6 percent of the impairments

suffered by the group studied were caused by diseases or injuries resulting from employment. The incidence of such disabilities increases rapidly with age and is much higher for men than for women. Injuries not connected with employment are responsible for only 4 percent of the major impairments. Congenital conditions or injuries at birth account for approximately 5 percent of the disabilities. The great majority of disabilities are brought on by age or serious illness and for the most part are chronic or degenerative diseases. Heart and circulatory ailments are the most common. About one-third of the mental and psychiatric disorders are congenital or were caused by certain injuries, as were about one-fifth of the epileptic impairments.

Where They Live

Most of these disabled persons are living in their own homes or at the homes of relatives or friends. With considerable effort they manage to care for themselves, and many of them undergo suffering and distress because they do not have other persons to care for them.

About 5,500 recipients of assistance, most of them chronic invalids, reside in institutions. About one-half of these are in nursing or convalescent homes. About one-fifth are in commercial boarding homes for the aged and another one-fifth, in other miscellaneous homes for the aged. The remainder are blind persons living in homes maintained by county institution districts. Under Pennsylvania's public assistance laws only blind pensions can be granted to persons residing in a public institution. Most of this group of 5,500 persons are able to manage their own affairs, and guardians or trustees have been appointed for only a small fraction. All of these persons, however, need some services beyond the basic items of food, shelter, and laundry. They are predominantly an aged group. The average age is 78 years, and 7 percent are 90 years of age or more.

A comparison of the above figures with similar studies made in other States indicates that these same relationships for all disabled persons are found rather generally throughout the

country. In a booklet entitled "Care of the Long-Term Patient," the Public Health Service has reported some comprehensive statistics for 1950. The study showed that in the country as a whole there were an estimated 5,298,000 persons who had been disabled for more than 3 months. Seventy-nine percent of these were living in places outside of institutions, such as their own or other private homes, boarding houses, or hotels. Twelve percent were in mental hospitals; 7 percent were in homes or schools for the handicapped and the aged and dependent; 1 percent were in tuberculosis hospitals, and less than one-half of 1 percent were in chronic disease hospitals and correctional institutions.

Money Grants

Under Pennsylvania's public assistance program, money grants are made to persons who are found to be in financial need on the basis of schedules of assistance allowances established by the Pennsylvania Department of Public Assistance with the approval of the Pennsylvania State Board of Public Assistance. Grants are made either to the assistance recipients themselves or to a trustee or guardian.

As mentioned, persons receiving a blind pension may reside in a public institution where they receive care and attention. Other recipients may reside in various types of privately operated institutions, but the assistance allowances do not include any additional amount of money necessary to pay for institutional services.

Under Pennsylvania law, county institution districts have a responsibility for persons who are physically and mentally infirm. As a result of a divided responsibility between the department of public assistance and county institution districts for indigent persons who are physically or mentally limited, it is an understatement to say that their needs are not being adequately met. But even if legislation is enacted to fix responsibility for this group of persons, this action in no way will decrease the number of persons who are financially dependent and in need of care.

The basic problem of disabled persons, including those with chronic illnesses, should be met by providing facilities for the care, treatment, and rehabilitation of those presently afflicted with chronic illnesses and by conducting an intense program of research into the causes of chronic illness in order to reduce the incidence and improve the methods of treatment. For the long run only the latter alternative will provide a solution.

Facilities Inventory For Chronic Sickness

PHR
brief

In Pennsylvania, one of the greatest needs of patients with chronic illness is for better facilities. Pennsylvania does not have one hospital specifically designed for the care of the chronically ill. However, four projects of this type have been requested under the new Medical Facilities Survey and Construction Act of 1954.

The chronically ill patients are now being cared for in the existing 1,344 institutions supervised or licensed by the bureau of homes and hospitals of the Pennsylvania Department of Welfare. These institutions by classification are 356 hospitals (exclusive of mental); 419 licensed nursing and convalescent homes; 289 licensed boarding homes for the aged; 218 nonprofit homes; and 62 county homes. Eighty-seven of the hospitals are licensed proprietary, and the rest are incorporated nonprofit.

Pennsylvania needs 20,968 beds for chronically ill patients, or 2 beds per 1,000 population, according to the 1954 revision of the State plan required under the Hospital Survey and Construction Program. Twenty-four facilities

are now supplying 1,613 acceptable and 358 non-acceptable beds. Nursing, convalescent, and boarding homes account for approximately 10,390 of the remaining 18,997 beds.

Under Pennsylvania law every home keeping for profit one or more persons requiring care, treatment, or nursing for sickness, injury, or other disability is required to be licensed. Every home providing for profit service or domiciliary care for three or more elderly persons who are not ill or in need of nursing care must also be licensed. No person classified as a patient may be kept in a licensed boarding home for the aged.

County homes give care—some of it good and some very poor—to all types of dependent persons. Fourteen county homes have approved medical facilities. Nine counties have no county homes. The department of welfare is making determined efforts to improve the care of the residents of these homes. One of the greatest problems facing the department is to get the individual county institution district authorities to recognize their responsibility for the care of their ill dependents. This responsibility is placed on these authorities by the county institution district law, which states "dependent means an indigent person requiring care because of physical or mental infirmity." A survey completed in the spring of 1954 shows that 43 counties contribute to patient care in nonprofit hospitals.

Responsibility for supervision of nonprofit homes for the aged was placed with the Pennsylvania Department of Welfare by the 1953 session of the State legislature. Rules and regulations for this group have been completed and mailed to them.

Although the number of institutions responsible to the bureau of homes and hospitals is steadily increasing, we do not now, nor can we in the foreseeable future, have anywhere nearly enough homes for all of our needy aged and chronically ill. Therefore, the department of welfare is doing all it can through education and consultation to see that the institutions under its supervision meet State requirements and give proper care to the needy residents of the State.

By Ira J. Mills, director of the bureau of homes and hospitals of the Pennsylvania Department of Welfare.

The Local Health Laboratory

PHR
brief

Laboratory service related to health is a cooperative effort between laboratory scientists who provide factual data and qualified persons who apply the data to the individual, the group, or the community.

To provide service intelligently, the laboratory should have some knowledge of the conditions under which the specimens were collected and other pertinent facts that will direct the laboratory efforts into productive channels. It must be aware of any special problems peculiar to the specimen which might influence the scientific findings of the laboratory.

The physicians or health officers the laboratory serves should receive laboratory reports as early as possible. Every day, in fact every hour, that passes between the time the specimen is collected and the time the report is received means just that much delay in applying the scientific facts of the report to the diagnosis of the disease and its indicated treatment or in instituting the proper measures to control its spread.

In short, close liaison must be maintained between the laboratory and its patrons if the service is to be effective and efficient. Local laboratories have the advantage of prompt communications—face-to-face conferences, local telephone calls, and short-distance written communications.

The liaison is particularly important to local, county, and district health departments since scientific facts, which can be determined only in the laboratory, are frequently the basis on which health department activities rest. No health department, regardless of the size of the population it serves, can operate efficiently without prompt laboratory service, which is best furnished by a local laboratory.

By Edmund K. Kline, Dr.P.H., director of laboratories, Cattaraugus County Department of Health, Olean, N. Y.

Although for many years the larger municipal health departments have maintained laboratories to provide local service, public health authorities have been slow to recognize the need for local laboratory services for suburban and rural populations through laboratories organized as integral divisions of local health units.

Decentralization

In the field of public health, laboratory service, in general, has been supplied by State health departments on a statewide rather than a local basis. In a small State, the central laboratory can perhaps serve the entire State, but centralized service in a larger State becomes increasingly difficult because of the lack of proper and prompt communication.

Many States now have programs aimed at decentralizing laboratory services, either by establishing branches of the central State laboratory or by stimulating the formation of local laboratories.

The State branch laboratory is actually a part of the State laboratory, under direction of the State laboratory director. Its personnel are State employees, and it is financed by the State as a part of its laboratory budget. It is usually placed in a strategic communications center for the purpose of getting the maximum amount of rapid mail service from the largest possible territory.

Maryland and Alabama, for example, have branch laboratory systems covering the entire State. Maryland maintains 12 branch laboratories in addition to the central laboratory in Baltimore, and Alabama maintains 8 branch laboratories directed from the State laboratory in Montgomery. Several other States maintain a few branch laboratories at strategic points but do not have a statewide coverage. Michigan has branch laboratories in Grand Rapids and Houghton, and Pennsylvania has branches in Wilkes-Barre and Pittsburgh.

The development of decentralized local laboratories integrated into a statewide system, but maintained by local communities, is well illustrated by the experience of New York State. The basic law promoting such service, passed in 1923, permits the county governing body, the

board of supervisors, to establish local laboratories to serve a whole or a part of a county. The same law permits the establishment of municipal laboratories by the city council or the incorporation of municipal services into the county laboratory district.

These local laboratories may be operated as independent services under a county board of laboratory managers or as an integral part of a city or county health department, or the city or county may contract with a hospital to have both public health and hospital services performed in a single laboratory. They operate under the supervision of the division of laboratories and research of the New York State Health Department, which inspects them, sets standard qualifications for their directors, reviews their methods, and issues annual certificates of approval to them.

A provision in the New York State law granting State aid to the extent of 50 percent of the net cost of operating the laboratories encouraged and stimulated their establishment. As a result of these permissive laws, New York State has some 45 city and county public health laboratories, most of them operating in conjunction with hospitals. In addition, about 105 hospital and private clinical laboratories have State health department approval although they do not receive financial assistance.

California has some 43 local laboratories administered under the jurisdiction of local health officers and supervised by the State laboratory.

Scope of Service

The scope of local laboratory service depends in part on the program of the local health department and in part on other local laboratory services available. It may even include services related to clinical and hospital medicine.

Traditionally, public health laboratory services have been related to communicable disease control and sanitation. All other laboratory services related to health have been classified as clinical and usually have not been performed in a public health laboratory.

However, in recent years the concept that all disease is a problem of the community has gained considerable headway, and official health departments have expanded their activities to

embrace such programs as diabetes and cancer control, geriatrics, dental hygiene, and mental health problems—programs that go far beyond communicable or community disease.

The prevention and control of communicable disease will certainly continue to be a part of all health department activities, and all local laboratories will continue to be prepared to identify the causative organisms and the vectors of such diseases and to perform the sanitary examinations that are concerned with their spread in a community.

If the local health department operates clinics or hospitals, the local laboratory will perform the examinations that will provide diagnostic or prognostic information regarding the patients attending the clinics or served by the hospitals.

Except for the diagnostic services with relation to communicable diseases, the services required by private practitioners will usually be referred to private commercial or hospital laboratories. However, if other local facilities are not available, services in such fields as hematology and biochemistry may have to be provided by the local health laboratory.

The health laboratory should also be prepared to serve the entire community in certain specialties, such as parasitology and mycology, if these services are not available at other local laboratories.

If, as is the general pattern in New York State, the public health laboratory is also acting as a hospital laboratory, its scope of service will be all-inclusive. The only distinction between public and private service is that patients who can afford to pay are usually charged a fee for all service not directly related to the communicable diseases. Welfare patients, or those classed as medically indigent, receive all services free of charge.

Organization

In even the smallest laboratory some effort should be made to departmentalize the work even though two or more departments must be combined under a single individual. Departments of bacteriology, serology, sanitary bacteriology and chemistry, hematology, and clinical chemistry, in addition to service and clerical

cal departments, are the essential ones. If hospital service is included, a separate department of tissue pathology is indicated. Specialties, such as parasitology, mycology, and virology, which do not furnish a volume of work sufficient to support a department, should be integrated into other departments according to the knowledge and skill of the workers in them.

Even if the laboratory staff is too small to provide one worker for each department, it is a great convenience to group the materials and supplies needed for each of the separate activities in one part of the laboratory and to attempt to arrange the flow of specimens through the laboratory as though there were separate and distinct departments.

Broad training in the laboratory sciences is indicated for the personnel in a local laboratory. Obviously, if one person has to serve in more than one department, he will have to be skilled in more than a single scientific specialty. Not many such broadly trained persons are available, but, if necessary, inservice or brief postgraduate training courses may be used to teach competent employees to function in several of the specialties.

Integration in a State System

If a comprehensive local laboratory coverage is developed and maintained, it must not be assumed that the services demanded of the State laboratory will decline. In fact, exactly the reverse is true, for in New York and California, the two States with the most comprehensive local laboratory coverage, the State health department laboratories have grown steadily year after year in response to new service demands. True, there may be a shifting away from the performance of simple routine examinations and concentration on the more specialized types of service and greater administrative and research responsibilities.

The local laboratory will be dependent upon a central State laboratory for many parts of its service program. In certain instances, it is desirable to have unexpected or unusual findings checked by some authority. For this purpose a State laboratory should offer a reference diagnostic service to review and confirm such results. The local laboratory will not be able

to employ experts in every scientific field. However, the State laboratory usually has such experts on its staff or has access to them through Federal agencies or educational institutions.

In certain technical fields it is neither desirable nor profitable for the local laboratory to carry its specimens to the final end result. For instance, the exact antigenic analysis of every *Salmonella* species isolated in a local laboratory is unnecessary. Culture of such organisms should be referred to the State laboratory for final studies.

Certain laboratory reagents can only be prepared and standardized in laboratories with access to sufficient clinical material to afford a proper evaluation. Other reagents are best prepared in large batches, each batch being carefully standardized so as to be of uniform titer and reactivity with previously used batches. The State laboratory should assume responsibility for all such reagents, either by actually preparing them or by testing commercial products and distributing them to the local laboratories.

State Responsibilities

The State laboratory should be the scientific center around which all of the laboratory work in the State is focused. It should keep abreast of new scientific and technical developments, determine their applicability within the State, and if found desirable recommend them to the local laboratories. It should also assume some administrative responsibility for the quality and uniformity of services provided by local laboratories.

Some uniformity of methods and reporting should be common to all local laboratories within a State. For instance, in reporting serologic tests for syphilis, it is confusing to have one laboratory report a result of 3+ while its neighbor reports it as positive 2 dils or 6 units. Likewise, it is not desirable to have one laboratory report on complement fixation tests alone while its neighbor reports on flocculation tests alone. Discrepancies, which will reflect on both laboratories, are bound to occur.

Either the State laboratory should prescribe and approve all methods, as does New York, or else the results of test specimens sent out by the

State laboratory should be used as criteria for assurance that comparable work is being performed by the local laboratories.

To minimize errors in technique or deviations from the accepted methods that may lead to incorrect results, the State laboratory should submit a series of "test specimens" to local laboratories from time to time. This procedure will check the actual performance of these laboratories against each other and against suitable control laboratories.

Maryland and Massachusetts have developed extensive programs of this type. Many other States have tried limited programs, and almost every State has used test specimens for syphilis serology in programs patterned after the Federal program for evaluating State laboratories.

The struggle to insure competent personnel for all laboratory services is a continuing one. The State laboratory should assist the local laboratories to maintain a high level of competence by setting standards, both in education and experience, for all local laboratory employees, and it should insure that these standards are met.

New York approves the qualifications of local directors only. California licenses all technical

employees after examination. Connecticut requires all serologists in local laboratories to prove competence by performance tests in the State laboratory.

The California State Health Department also licenses all schools giving courses in laboratory science and issues registration certificates to all trainees in such schools. Upon completion of a prescribed training course, the State gives examinations. Those passing the test are licensed to work either in health department laboratories or in the 800 to 900 clinical laboratories licensed in the State.

The State laboratory can assist in training by encouraging personnel from local laboratories to spend training periods in the State laboratory. Refresher courses may be offered in the State laboratory or in selected training centers covering various regions of the State. Specialty experts can be sent on trips to local laboratories. Some States have made scholarships available to local laboratories for advanced study at educational centers.

Finally, the State laboratory should take active leadership in all activities of health laboratories of all kinds in order to weld them into a harmonious service system.

On the Care of Premature Infants

"Your Premature Baby," a pamphlet for parents of prematurely born babies, has been recently issued by the Children's Bureau, Department of Health, Education, and Welfare, as a supplement to the bureau's booklet on "Infant Care."

All babies weighing $5\frac{1}{2}$ pounds or less at birth are usually considered as premature.

The new leaflet tells parents what happens to their child at the hospital until the time when he is ready to be brought home and why he may need special care. It provides brief answers to the questions that parents most commonly ask, such as: Will the baby always be small and weak? Will he be "late" in developing? Will he be normal mentally? Does a 7-month premature infant have a better chance of surviving than an 8-month infant has?

Copies of the new publication may be purchased from the Superintendent of Documents, United States Government Printing Office, Washington 25, D. C., for 10 cents each.

technical publications

Management of Venereal Disease

Public Health Service Publication No. 327. Revised 1954. 14 pages.

The 1954 revision of this pamphlet briefly states the latest (as of June 1, 1954) information available on the treatment and re-treatment of venereal diseases. The pamphlet is available to physicians, nurses, students of medicine and allied professions, medical societies, and other professional groups.

The schedules for treatment of primary and secondary syphilis are based upon experience of the Venereal Disease Branch, Public Health Service. Schedules for treatment of other stages of syphilis and other venereal diseases are based upon experience of various workers and have been used satisfactorily at the Service's treatment centers.

The management of gonorrhea, nonspecific urethritis, saprophytic spirochetel balanitis, chancroid, granuloma inguinale, and lymphogranuloma venereum, as well as syphilis, are outlined in the pamphlet.

Chronic Illness

Digests of Selected References, 1950-52

Public Health Service Publication No. 305 (Public Health Bibliography Series No. 1, Supplement). 1953. By Violet B. Turner. 262 pages. \$1.00

In 1951, digests of selected references on chronic disease published before 1950 were issued as Public Health Service Publication No. 10. This supplement contains digests of articles and books published during 1950-52. The digest numbers are continued from the earlier bibliography and the indexes cover both publications.

In a few instances publications issued before 1950 and early in 1953 are included. A new section on planning, design, and construction of institutions for the chronically ill, for example, was made as complete as possible by including some earlier references even though a few entries duplicated those in the first volume. Other new sections are those on coordination of facilities and services and on prevention and control. The subsection on nursing homes has been divided into three parts to facilitate its use.

Remaining sections in the bibliography are: dimensions of the problem, contributory factors, rehabilitation, noninstitutional services, and institutional services.

Clinical material dealing with specific medical diagnosis or treatment of chronic disease has been excluded in both volumes.

Communicable Disease Center Activities, 1952-53

Public Health Service Publication No. 391. 1954. 31 pages; illustrated.

Intended as an aid to State, local, and other health agencies in planning their programs, this report summarizes the major activities of the Communicable Disease Center, Bureau of State Services, Public Health Service, during the fiscal year 1953.

It treats in general terms, rather than precise grouping, the scope, nature, and interrelationships of activities as conducted in different areas of the public health field by the CDC staff. The current structure of the center is shown in a flow chart; its professional personnel are described, and field installations are listed.

The report discusses projects pertaining to established procedures and practices, such as administration and management, epidemic intelligence service and disaster aid,

laboratory training, disease control operations and demonstrations, control of arthropod vectors and animal reservoirs of disease, and training programs for field work and for aids.

The section entitled "Activities Directed Toward Specific Diseases" discusses the CDC activity in relation to such individual diseases as anthrax, diarrheal diseases, encephalitis, leprosy, malaria, pinworms, poliomyelitis, rabies, trichinosis, and many others.

Report of Local Public Health Resources, 1952

Public Health Publication No. 398. 1954. By Clifford H. Greve, Josephine R. Campbell, and Kathryn Connor. 85 pages; tables.

This annual report of personnel, facilities, and services in local areas is the sixth since 1946 in a series of analyses based on data submitted to the Public Health Service by full-time local health organizations. Data for 1948 is unpublished.

Those units reporting as of December 31, 1952, (excluding Alaska, Hawaii, Puerto Rico, and the Virgin Islands) number 1,313 organizations and include 2,207 counties and 215 independent city health departments serving more than 88 percent of the population of the United States. Approximately 50 units did not report.

The current analysis in addition to the extent of coverage is presented in these categories: personnel engaged; selected public health services and clinical facilities; selected community sanitation facilities and services; and per capita expenditures for public health and per capita income of areas served.

The number of personnel employed full-time increased over the previous year. Public health nurses continued to be the most acute staffing deficiency in the majority of health units, followed by sanitation personnel, physicians, and clerks.

The selection of services and clinical facilities for inclusion in the report was made on the basis of significance to program divisions of the

technical publications

Public Health Service and the Children's Bureau. Provision of chest X-ray for tuberculosis case finding ranked first among services reported. Topical fluoride application and diabetic group instruction were the two reportable services least frequently included in health programs.

In the selected community sanitation facilities and services category, there was slight difference between the 1952 information and that submitted for 1951.

For the first time this 1952 report carries information on the expenditures for public health services by units and the per capita income for each jurisdiction. The majority of the single county units and local health districts spent between \$0.50 and \$1.00 per capita; the largest proportion of city health departments, \$1.00 and \$1.50. No expenditure data were available for 9 percent of the reporting units.

Pulmonary Fibrosis in Soft Coal Miners

An annotated bibliography on the entity recently described as soft coal pneumoconiosis

Public Health Service Publication No. 352, Public Health Bibliography Series No. 11. By H. N. Doyle and T. H. Noehren. 59 pages. 25 cents.

This bibliography contains abstracts of publications presenting information on a form of respiratory disability among soft coal miners believed to be unrelated to and different from silicosis. The disability is associated with prolonged inhalation of excessive amounts of coal dust. The incidence of the condition is particularly high in south Wales, and Great Britain has been making long-range comprehensive studies of the disease, which is gaining in medical significance. Various groups in this country are

finding these studies of particular interest.

The foreword of the bibliography describes the symptoms of the pulmonary ailment and explains the identification and nomenclature problems met in assembling the material for this publication. It points out that the compilers have chosen papers presenting a cross section of views on the subject and historical reviews, using as much as possible in their abstracting the language of the original authors.

The abstracts are chronologically arranged—the first, a paper published in 1834.

Directory of State and Territorial Health Authorities, 1954

Public Health Service Publication No. 75. Revised 1954. 73 pages. 30 cents.

The 1954 revision of this directory was compiled from information reported to the Public Health Service as of May 1954 by State and Territorial health departments and by other State agencies participating in grant programs administered by the Public Health Service. Also included are agencies officially designated for the administration of the Water Pollution Control Act and State agencies other than health departments administering crippled children's services.

The listing of health department personnel is designed to reflect the organizational structure of State health departments and to delineate placement of responsibility for the major health functions. The principal organizational units and subordinate components are arranged alphabetically, according to the current departmental organization. The name of each health official appears opposite the unit which he

directs. If the name of the health unit is not self-explanatory, its major functions are noted.

The title and location of each State health department and the name of the health officer in charge is in a section preceding the organizational listing of officials for the individual States. The same information is shown for other State agencies designated to administer any pertinent program, such as mental hygiene.

Personnel of the Public Health Service in charge of functions closely associated with State health departments are listed in the appendix.

Refuse Collection and Disposal

A Bibliography—1951–1953

Public Health Service Publication No. 402. Public Health Bibliography Series No. 4 (Supplement A). 1954. 39 pages.

The first volume of this bibliography, Public Health Service Publication No. 91, listed items which appeared during 1941 and 1950. The present supplement covers the years 1951–53.

The organization of the listings is substantially the same as in the first volume. The five main divisions of the bibliography are regulations, finances, storage, collection, and disposal. The sections on collection and disposal are subdivided further as in the earlier book.

This bibliography is intended as an aid in the exchange of information in research and operational phases of refuse-sanitation activities.

Home Care of the Sick

Public Health Service Publication No. 70, Health Information Series No. 21. Revised 1954. 2-fold leaflet. \$2.50 per 100.

This leaflet contains general information on taking care of sick persons at home. It describes how to select a bed and other sick room

technical publications

equipment and gives similar patient-care instructions. The publication also outlines ways in which the attendant can be of help to the physician and suggests organizations and individuals who can give instructions in nursing care.

Ringworm

Public Health Service Publication No. 46. Health Information Series No. 6. Revised 1954. 1-fold leaflet. \$2.00 per 100.

Ringworm is the common name for skin diseases caused by a fungus growth. This leaflet describes four varieties and their effect upon the body. The most common is ringworm of the feet known as athlete's foot; the others are ringworm of the scalp, of the body, and of the nail.

The pamphlet tells of the symptoms of each, explains the danger of contagion, and suggests preventive measures. It advises seeking prompt medical attention to obtain proper treatment in each case.

Proceedings of the Third Research Conference on Psychosurgery: Evaluation of Psychosurgery

Public Health Service Publication No. 221. 1954. 173 pages; illustrated. \$1.00.

The proceedings of the Third Research Conference of Psychosurgery held in New York City in 1951 under the auspices of the National Institute of Mental Health, Public Health Service, are presented in this publication. Most of the participants had also attended the two previous conferences: the first, held in 1949, on the criteria for selection of patients for psychosurgery; the second, in 1950, on the determination and measurement of the effects of psychosurgery.

The 1951 conference devoted its attention to a general evaluation of psychosurgery—its indications, methods, and results. The theme of the conference is developed by the speakers as they give their evaluation of psychosurgery in relation to drive, social service, reaction to painful stimuli, treatment of intractable pain, psychoneurosis, sex variants, psychopathic personality, and organic cases with emotional manifestations.

The publication also includes the report on techniques of psychosurgery given by the Committee on Surgery, a summary of the findings of the three conferences, and appendices.

Pinworms

Public Health Service Publication No. 108 (Health Information Series No. 51). Revised 1954. 1-fold leaflet. 5 cents. \$2.00 per 100.

Pinworms are discussed from the viewpoint of their effect on persons, especially children in this recently revised leaflet. Symptoms and diagnosis of pinworm infection are described. Suggestions are offered for the control of pinworms and their eggs to prevent spread of infection within a household. Treatment by a physician is recommended for infected persons.

Hospital Services—Pharmacy

Prepared by the Division of Hospital Facilities, Public Health Service. 1954. 42 pages; illustrated.

Suggested plans, equipment, supply lists, minimum standard, and organization for hospital pharmacies are presented as an integral part of the Public Health Service activities relating to the Hospital Survey and Construction Program.

Directed to architects, hospital administrators, pharmacists, and others concerned in hospital planning, this pamphlet is designed to help them understand the functions, layout, and equipment of hospital pharmacies.

The booklet is a compilation of articles prepared by the Division of Hospital Facilities which have appeared in other journals. The five sections of the booklet include suggested plans for hospital pharmacies; suggested equipment lists for hospital pharmacies; pharmacy supplies and pharmacological index; minimum standard for pharmacies in hospitals; and a discussion of the value of a hospital pharmacist.

Home Sanitation

Public Health Service Publication No. 231, Health Information Series No. 39. 2-fold leaflet. \$2.50 per 100.

Home sanitation facts, important in the control of communicable diseases, are pointed out in this leaflet. It describes the precautions that should be taken to safeguard the water supply and gives advice on sewage and refuse disposal. Outlined are the best methods of combating flies and other insects and rats. It also gives information on proper light and ventilation, heating, plumbing, refrigeration, and accident prevention in the home.

This section carries announcements of all new Public Health Service publications and of selected new publications on health topics prepared by other Federal Government agencies.

Publications for which prices are quoted are for sale by the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C. Orders should be accompanied by cash, check, or money order and should fully identify the publication. Public Health Service publications which do not carry price quotations, as well as single sample copies of those for which prices are shown, can be obtained without charge from the Public Inquiries Branch, Public Health Service, Washington 25, D. C.

The Public Health Service does not supply publications issued by other agencies.
